AFSC LABORATORY MANAGEMENT

INFORMATION REQUIREMENTS PROJECT

DECEMBER 1981
(REVISED AUGUST 1982)

DIRECTOR OF LABORATORIES

AFSC
MANAGEMENT INFORMATION
REQUIREMENTS PROJECT

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LABORATORY IRM (LIRM) MANAGEMENT WORKING GROUP

DIRECTOR OF LABORATORIES

AIR FORCE SYSTEMS COMMAND

FOREWORD

This document was developed under the auspices of the Laboratory IRM (LIRM) Management Working Group in response to AFSC Program Directive 0008-81-1, Management Information Requirement Project (23 February 1981). The project is being managed under the lead organization concept through Data Administration channels. The Air Force Wright Aeronautical Laboratories (AFWAL) has been designated as lead laboratory. The project team consists of the Data Administrators from each DL field organization and selected members of the DL headquarters staff. Technical consultants from various laboratory functional areas also participated in this study.

The objective of this effort is to identify management information requirements common to all DL field organizations. Requirements are identified in terms of broad functional categories and required management products. This information is then related back to the major business functions for a typical laboratory. Information requirements are dependent on many variables including current business environment, organizational structures, missions, etc. Consequently, information needs will change with time. This report attempts to treat these requirements in a general sense in order to provide a realistic framework for future information system development efforts. The document should be viewed as a first step in the development of a long range information resource management program for the laboratories.

The initial version of this report was reviewed by each organization participating in the study. Coordination/approval letters are included in Appendix F. The revised report includes changes recommended during the coordination process.

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Many people participated in the Laboratory Management Information Requirements Project and contributed to the development of this document. Their efforts significantly contributed to the success of this project. Some of the key people are listed below:

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TABLE OF CONTENTS

SUMMARY OF RESULTS

- Common information requirements primarily stem from headquarters' information needs. These requirements lend themselves to some form of standardization.
- Unique requirements are generated by differences in mission, organizational structure, external interfaces, local base environment, etc. Standardized systems cannot effectively handle these requirements.
- A "meet at the interface concept" (standardized information/communications interface between headquarters and field organizations) offers the best hope for effective and realistic information resource management.
- There are two distinct levels of information requirements. The first involves information needed by a program manager to manage a program. The second is that information which is needed to report program status/progress to management. The potential for increased productivity through simplified manual systems or automation exists at both levels.
- Very few operational management information systems actually help the project engineer perform the mission. Existing systems do not provide sufficient local flexibility to reduce work load in the project engineering function. Blending modern information management technology with productivity enhancement tools should be able to resolve this problem.
- Significant gains can be made by improving the flow of information among headquarters' staff offices. Information requested from the laboratories is often available at headquarters level in some staff office. The CMIS initiative should improve this problem. However, the laboratories have a

responsibility to ensure that accurate laboratory data resides in headquarters' data bases.

- Some RCS and non-RCS reports no longer go to the Headquarters office that originally requested them. In some cases the office no longer exists and in other cases only parts of reports are still useful. This results in unnecessary and unproductive work load for the offices involved.
- A bottom-up analysis of information needs showed that the results were heavily oriented toward operational day-to-day needs. Current automated management information systems are directed toward the support of operational needs. Long range information needs are basically handled by manual approaches.
- Manual approaches used to provide information in the strategy development, major thrust planning, and program formulation phases are highly labor intensive and lack the real-time flexibility that is needed for an effective decision support system. Productivity enhancement tools coupled with improved MIS capability should resolve this deficiency.
- A top-down analysis of key laboratory goals and critical success factors shows that current automated information systems do not provide the type of information top management needs to track progress toward achieving key organizational goals. New Information Resource Management (IRM) initiatives at Headquarters AFSC are beginning to address this problem.
- Realistic decision support systems need to be developed for management tailored to the proper level of responsibility and the mission. These systems should include the capability to store historical data in key business functions in order to facilitate trend analysis. In order to support strategic and tactical planning functions, we must develop an adequate way to handle classified data in a real-time environment.

- A well-coordinated inter-command IRM initiative is essential. Initial attention should focus on the operational interfaces between a laboratory and its local support organizations. This area has the highest potential for improvements in mission performance, laboratory operations, and productivity.

As a result of this study, two sets of recommendations were developed. The first set addresses those issues oriented toward HQ AFSC/AC.

- (AC1) Initiate Headquarters/Field interface standardization efforts to accomplish the following:

  a. Identify required data elements at the Headquarters level including those covered in standard management information systems and develop uniform definitions for those data elements.

  b. Implement standard data transfer protocols for electronically transmitted data.

  c. Implement uniform and effective long haul communications procedures.

- (AC2) Develop and implement techniques to improve automated data transfer between standard and local management information systems to avoid redundant data entry efforts.

- (AC3) Initiate a joint IRM/IRMCO study of RCS and non-RCS reports with the goal of eliminating or reducing those reports that are of questionable value or no longer needed. Current regulatory reviews under IRMCO do not receive sufficient management attention to be effective.

- (AC4) Allow field organizations flexibility to develop information systems to satisfy their unique requirements with capability to "meet at the interface" for headquarters required data.

- (AC5) Implement a continuous IRM coordination process among product divisions, test centers, and laboratories to exchange views and evaluate "lessons learned."

The following set of recommendations addresses those issues pertinent to HQ AFSC/DL.

- (DL1) Develop an Integrated Laboratory IRM Program Management Plan compatible with HQ AFSC IRM Policy and Initiatives that can be used to augment and enhance the overall AFSC IRM Program Management Plan developed by the IRM Program Management Office at Electronic Systems Division.
- (DL2) Establish an intercommand productivity enhancement initiative to improve the information interface between laboratories and their local supporting organizations.
- (DL3) Develop an effective coordination channel with AFLC's Logistics Information Management Support System (LIMSS) Project to provide AFLC with the benefit of Laboratory IRM experience and to ensure that Laboratory/AFLC information interfaces are adequately addressed.
- (DL4) Initiate a study of existing standardized management information systems used by the Laboratories, e.g., MASIS, JOCAS, etc., and recommend near-term improvements that are realistic to implement.
- (DL5) Improve the flow of information among headquarters staff offices to avoid unnecessary tasking of field organizations for information already available at headquarters.

I. INTRODUCTION

The Air Force Systems Command (AFSC) is a large complex organization requiring extensive amounts of information to support day-to-day operations and long range activities. Recognizing this fact, AFSC initiated the Command Management Information System (CMIS) Project early in 1979. CMIS is a concept to integrate command-wide information into a form suitable to support Headquarters AFSC activities. Initial CMIS subsystems (CMIS-LS, CMIS-D, CMIS-K, etc.) have been developed to solve immediate needs for management information. In addition, a number of advanced technology programs have been initiated to demonstrate modern information management and office automation concepts.

Headquarters quickly realized that effective management of information resources required a much broader scope of effort. No single automated management information system could solve all of Headquarters AFSC's information needs or provide an effective way to manage information resources. Consequently, a comprehensive Information Resource Management (IRM) Program was formulated. The scope of IRM extends beyond automated data systems. It involves the management of all organizational information, whether automated or not. IRM requires a fully coordinated and cooperative interaction among all levels and functions in an organization. Some of the goals proposed for an effective information resource management program are as follows:

a. Treat information as a resource.

b. Identify the cost and burden of information requirements.

c. Improve the ability to answer questions and provide information for decision-making.

d. Reduce the manhours and dollars required to process, manage, and use information.

e. Improve productivity.

f. Get managers, S&Es, and support personnel thinking more about effective management of information.

The first step in an effective information resource management program is to adequately describe current and future information needs. Once that has been accomplished, you can evaluate existing information systems capability against those needs to determine where there are major voids. In addition, you can use these needs to guide long range system development efforts. In December 1980 at the AFSC Comptroller's Conference, Brigadier General Vaught emphasized the need for an AFSC-wide management information requirements definition effort. By February 1981, lead organizations were selected to implement the requirements definition project. This report describes the effort conducted by AFSC Research and Development Laboratories and other organizations reporting to the Director of Laboratories, HQ AFSC/DL.

The overall objective of this study is to identify and document information requirements common to all laboratories and other organizations reporting to the Director of Laboratories. No attempt was made to identify laboratory unique information requirements since such an effort would have little impact on any command-wide systems integration effort. The study was managed by the Air Force Wright Aeronautical Laboratories (AFWAL) as part of the Laboratory IRM Management Working Group. The current organizational structure of the group is shown in Figure 1. The LIRM Management Working Group consists of the Data Administrators and CMIS Focal Points from each DL field organization and the DL Data Base Administrator.

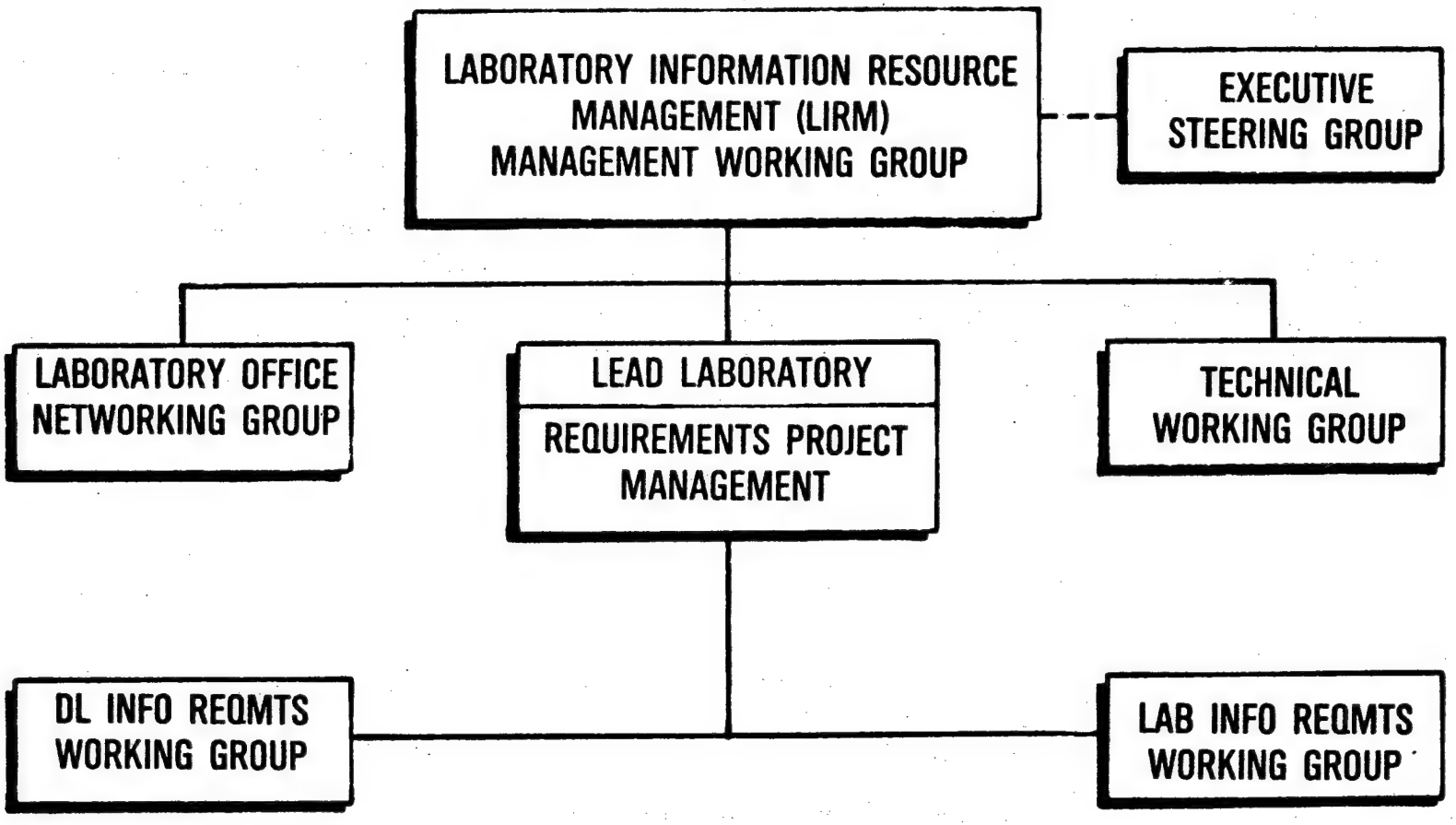


FIGURE 1: PROJECT MANAGEMENT STRUCTURE

This group coordinates all information resource management and office automation activities for DL organizations. The Executive Steering Group consists of the Deputy Directors from each DL field organization and is chaired by the Deputy Director of Laboratories. The Steering Group provides primary policy guidance for all LIRM Management Working Group activities. During the course of this project, the Steering Group provided the Lead Laboratory with executive guidance and oversite review through the DL Field Data Administrators. The Lead Laboratory worked through two working groups, one representing Headquarters DL staff organizations and one representing all DL field organizations. Also included in the LIRM Management Working Group structure are two additional groups that coordinate laboratory office networking plans and provide technical consulting services to the LIRM Management Working Group.

Prior to initiating the requirements project, AFWAL conducted a comprehensive survey of existing information requirements studies. It soon became apparent that a great deal of information was already documented concerning the information needs of various organizations throughout the command. Methodologies used in these studies to assess information requirements are briefly described in Appendix A. Based on the extensive amount of data available, AFWAL proposed an in-house approach to the requirements effort. Results from available studies were integrated and refined using inputs from the DL Field Data Administrators. The Laboratories' initial approach involved a detailed examination of information flows and specific information products. One deficiency in this approach is that it tends to become very detailed and is very dependent on specific organizational structures. Based on an information exchange meeting held with the lead center (Space and Missile Test

Organization, SAMTO), and the lead product division (Aeronautical Systems Division, ASD), the laboratories decided to modify their approach. SAMTO used a methodology that emphasized business functions and related information classes. By viewing information needs in the framework of business functions and information classes you can avoid many of the deficiencies in the organizationally specific methodologies. Since HQ AFSC was ultimately going to integrate the inputs from the centers, product divisions, and laboratories, the lead organizations agreed to use the SAMTO methodology as the unifying framework for all three studies. Figure 2 describes the final methodology employed by the laboratories. This methodology incorporates the early laboratory approach into a business function analysis format.

The laboratory approach basically consists of a four-step process:

1. Define the major business functions associated with a typical DL research and development organization.

2. Identify information classes pertinent to the typical organization.

3. Evaluate information processes by examining existing information flows and products. Details concerning this portion of the process are presented in Appendices B and C. Use this information to ensure that the business functions and information classes adequately represent organizational activities. Once this is done, business functions and information classes can be grouped together to aid in identifying current information deficiencies.

4. Finally, identify information requirements. The actual identification of requirements was done in two ways. The first represents a bottom-up approach. Day-to-day (operational), near-term (tactical), and

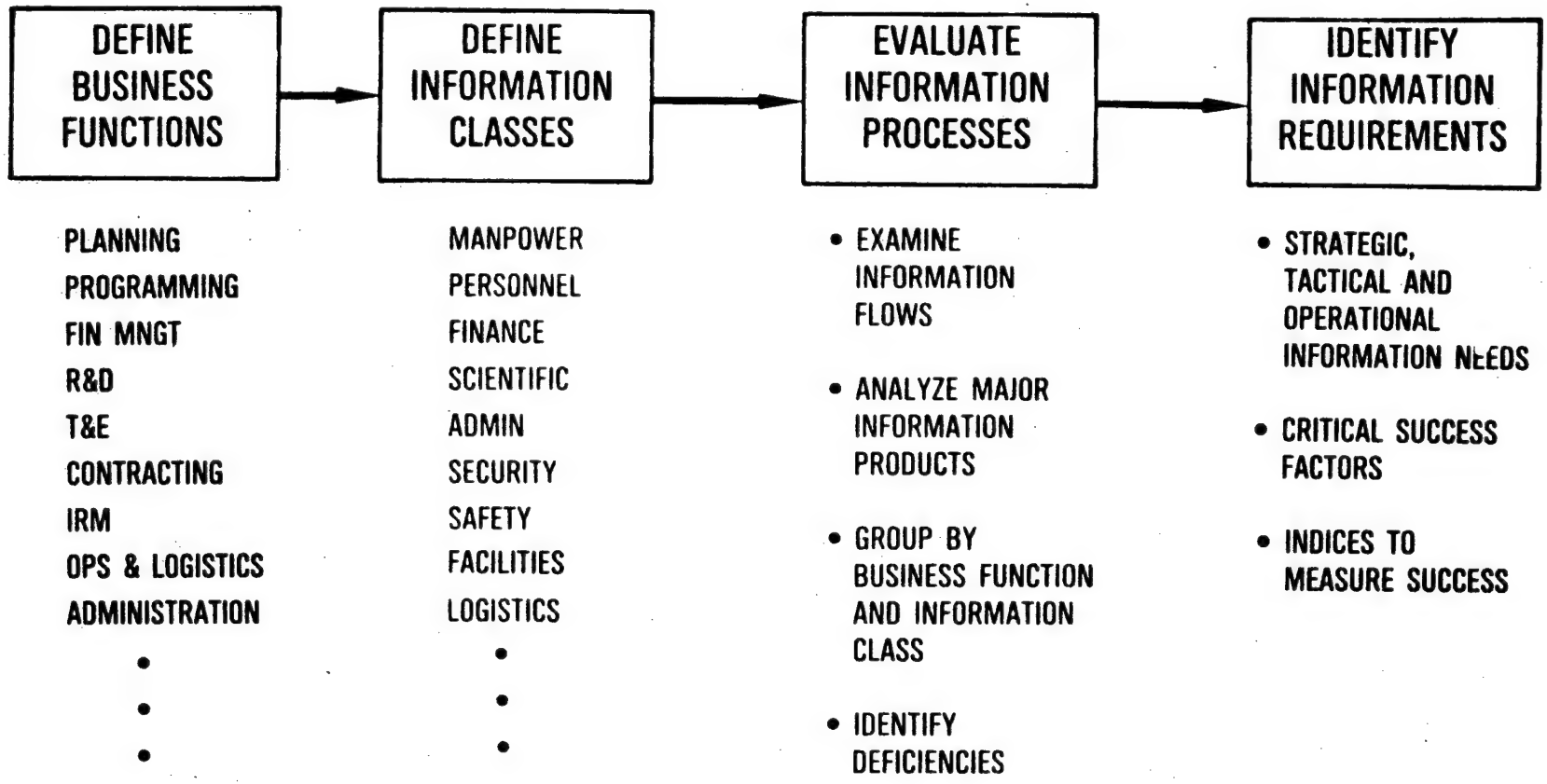


FIGURE 2: METHODOLOGY TO IDENTIFY INFORMATION NEEDS

long range (strategic) information needs were identified and categorized in terms of business functions and information classes. Many of the needs were extracted from existing studies and were then refined by the study team. The second approach involves a top-down analysis. The critical success factors method was used to identify information needs starting at the top level in the organization and working down. This method was developed by the Center for Information Systems Research, Sloan School of Management, Massachusetts Institute of Technology. Details concerning this approach can be found in Appendices A and D. One key element necessary to effectively implement the critical success factors method involves the development of indices to measure success. Appendix E addresses this subject in some detail. In reviewing this information, however, we must keep in mind several of the previously stated goals for IRM, i.e., (1) to identify the cost and burden of information requirements and (2) to reduce the manhours and dollars required to process, manage, and use information. Adoption and full implementation of the critical success factor approach and the resultant computation of indices could require a substantial increase in administrative work load to the detriment of the mission. The information provided in this report should be viewed as general background for future work. No attempt was made to conduct economic analyses to determine the cost of manual or automated systems to supply the information needs identified in this report.

The major portion of this report begins with the development of a representative laboratory organization and an overview of current management information processes. Major business functions are identified and related back to the activities of the model laboratory. Information requirements are defined in terms of strategic, tactical, or operational

needs and are categorized by business function and information class. Finally, general conclusions and recommendations are developed based on the results of this study.

II. LABORATORY OVERVIEW

The AFSC Research and Technology Laboratories are currently undergoing a major realignment. Under the realignment plan, the laboratories formerly reporting to HQ AFSC/DL will be operationally attached to product divisions while continuing to receive technical program guidance and funding from the Director of Laboratories. Since there is a continuing requirement for laboratories to interface with HQ AFSC/DL, the information needs, study results, and recommendations contained in this report remain valid.

The following organizations were included in this management information requirements project:

Aerospace Medical Division, AMD

Air Force Aerospace Medical Research Laboratory, AFAMRL

Air Force Armament Laboratory, AFATL

Air Force Engineering Services Center, HQ for R&D, AFESC

Air Force Geophysics Laboratory, AFGL

Air Force Human Resources Laboratory, AFHRL

Air Force Office of Scientific Research, AFOSR

Air Force Rocket Propulsion Laboratory, AFRPL

Air Force Weapons Laboratory, AFWL

Air Force Wright Aeronautical Laboratories, AFWAL

Headquarters AFSC, Director of Laboratories, HQ AFSC/DL

Rome Air Development Center, RADC

United States Air Force School of Aerospace Medicine, USAFSAM

All of these organizations participated in this management information requirements definition effort through their Data Administrators and Deputy Commanders/Deputy Directors.

A. LABORATORY R&D MANAGEMENT CYCLE

Many of the DL organizations are relatively unique in their organization structure, their relationship to parent organizations, and their local base environment. This made it extremely difficult to develop a common approach to define information requirements. The requirements working group attempted to resolve this problem by first establishing a representative laboratory research and development management cycle. This generalized model is shown in Figure 3. Regardless of whether an organization issues grants or contracts, conducts in-house research or provides support and services, they must go through some generalized process that includes a strategy development, planning, program formulation and program execution. Figure 3 was our attempt to generalize that process. This process representation can be somewhat deceiving in the sense that it tends to oversimplify the R&D business. However, we chose to retain the representation because its simplicity lends itself to further discussion. We must recognize that at any given point in time an organization is participating in all four process steps simultaneously. We are executing the current year program, formulating next year's program, and developing strategy for the out-years. Included in this process is analyses of past years' performance, productivity, manpower, costs, etc.

In tracing through this process, we see that all of our DL organizations have a specific mission to perform. They receive requirements through such procedures as Statements of Operational Need (SONs), Required Operational Capabilities (ROCs), Technology Needs (TN), Logistics Needs (LN), etc., and use these inputs during the strategy development effort. They are authorized manpower and money to accomplish the mission and to respond to these needs. They also receive policy

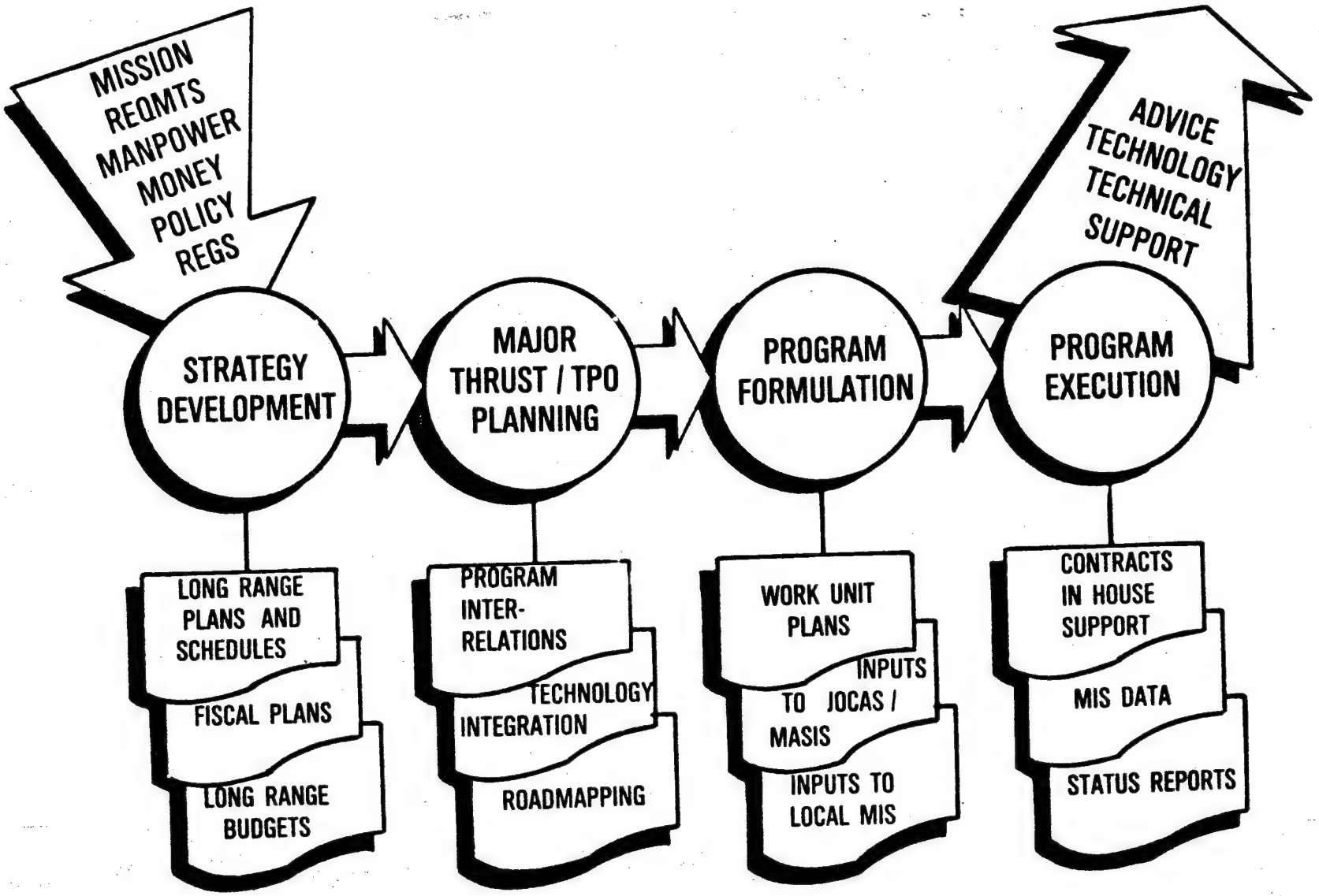


FIGURE 3: SIMPLIFIED LABORATORY R&D MANAGEMENT CYCLE

guidance and regulations that provide a regulatory framework for operations. During the strategy development phase laboratory personnel interact through DL with AFSC planning initiatives such as VANGUARD. VANGUARD is an AFSC-wide planning methodology used to integrate various AFSC technology initiatives to achieve desired capabilities. Other initiatives include AFSC's 1990's study and Air Force's 2000 study. Laboratory planners and line engineers work together with Headquarters personnel and others to develop long range strategic plans to meet the needs of the future. The next step in the process is a tactical planning effort necessary to focus technology development and integrate those technologies to adequately support Air Force systems needs. During this phase, program interrelations are evaluated, integration needs are assessed and integrated technology road maps are developed. Historical data is required to review completed programs, funding, manpower, etc., and develop realistic trend analyses. These activities directly contribute to the Five Year Development Plan (FYDP).

After the major planning activities have been completed, the laboratories move into the more operationally oriented phases associated with the formulation and execution of the Management and Scientific Information System (MASIS) and the Job Order Cost Accounting System (JOCAS). Additional information on these standard systems will be presented later in this report. At this stage the budget implementation activity takes place. This leads us to the final phase of our generalized process, program execution. Contracts for the budget year are initiated, in-house programs are started, etc. Considerable operational management information data is developed and fed into local and standard systems. Program tracking activities are emphasized and many status reports are

prepared. Experience gained from the continual overlapping of the four management cycle processes coupled with the technical expertise resident in the DL organizations result in an exceptional capability to provide technical advice, develop needed technology and provide other forms of technical support.

B. LABORATORY INTERFACES

During the course of day-to-day operations, laboratories and other organizations included in this study must interface with a variety of activities. Many of these interfaces are unique to a specific organizational environment. For example, RADC has its own comptroller and procurement organizations while AFWAL relies on the Aeronautical Systems Division (ASD) for comptroller and procurement services. AFOSR has its own procurement organization. In general, however, most organizations rely on the local base or some other organization for this type of support. Figure 4 represents the typical interfaces that can be expected in an R&D organization. The laboratory interfaces with its own headquarters, other Air Force organizations, other government activities, industry, universities, and local community activities. In some instances, laboratories have data exchange agreements with foreign governments. All of these interfaces have some impact on management information processes. At the local level, laboratories interact with base and other local organizations for a number of support services. Some of those services are included in Figure 4. Since these interactions are very dependent on the local environment and specific organizational structures, this report treats them in a very general way. Most of the information requirements addressed in this report are those that can be viewed as common for all R&D

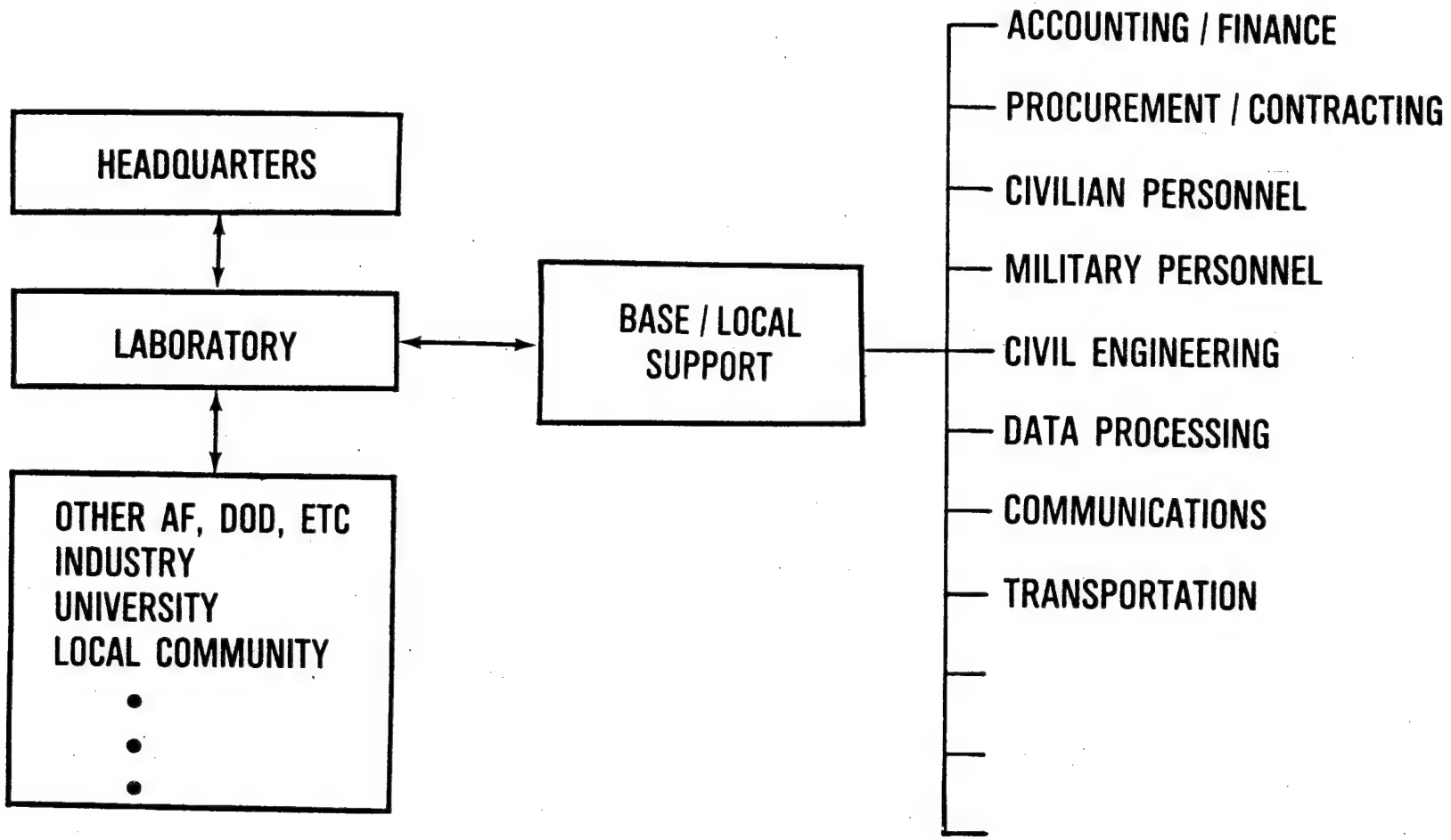


FIGURE 4: TYPICAL LABORATORY INTERFACES

organizations and/or those that cross the interface boundary between the field organization and the headquarters.

C. A REPRESENTATIVE LABORATORY ORGANIZATION

One of the first tasks involved in evaluating the information requirements was to examine the mission and organizational structure of each unit participating in the study. During that task it became obvious that no single organization structure could adequately describe all of the organizations. Figure 5 represents an attempt to model most of the activities comprising a typical R&D organization. It is a composite representation from several different organizations. Although this model does not accurately represent such unique organizations as AFOSR or HQ AFESC/RD, it can form a basis for discussion of information requirements for most of the laboratories.

Most laboratory organizations follow a conventional line and staff structure. Under this structure, there are three primary activities--staff offices, line divisions, and a support division. Staff office chiefs, line division chiefs, and the support division chief report directly to the Commander/Deputy. In order to improve span of control, some organizations such as AFWAL and AFRPL have consolidated staff offices under a management services or technical services function. This model treats the plans and programs office in the conventional line/staff way, but also lumps other staff offices under a management services function. Financial management support, data automation, manpower and personnel, administrative support, and library functions are all included under management services. Their primary function is to provide management services for the line divisions and the command section. The technical services division includes such functions as facility engineering, material control (supply support),

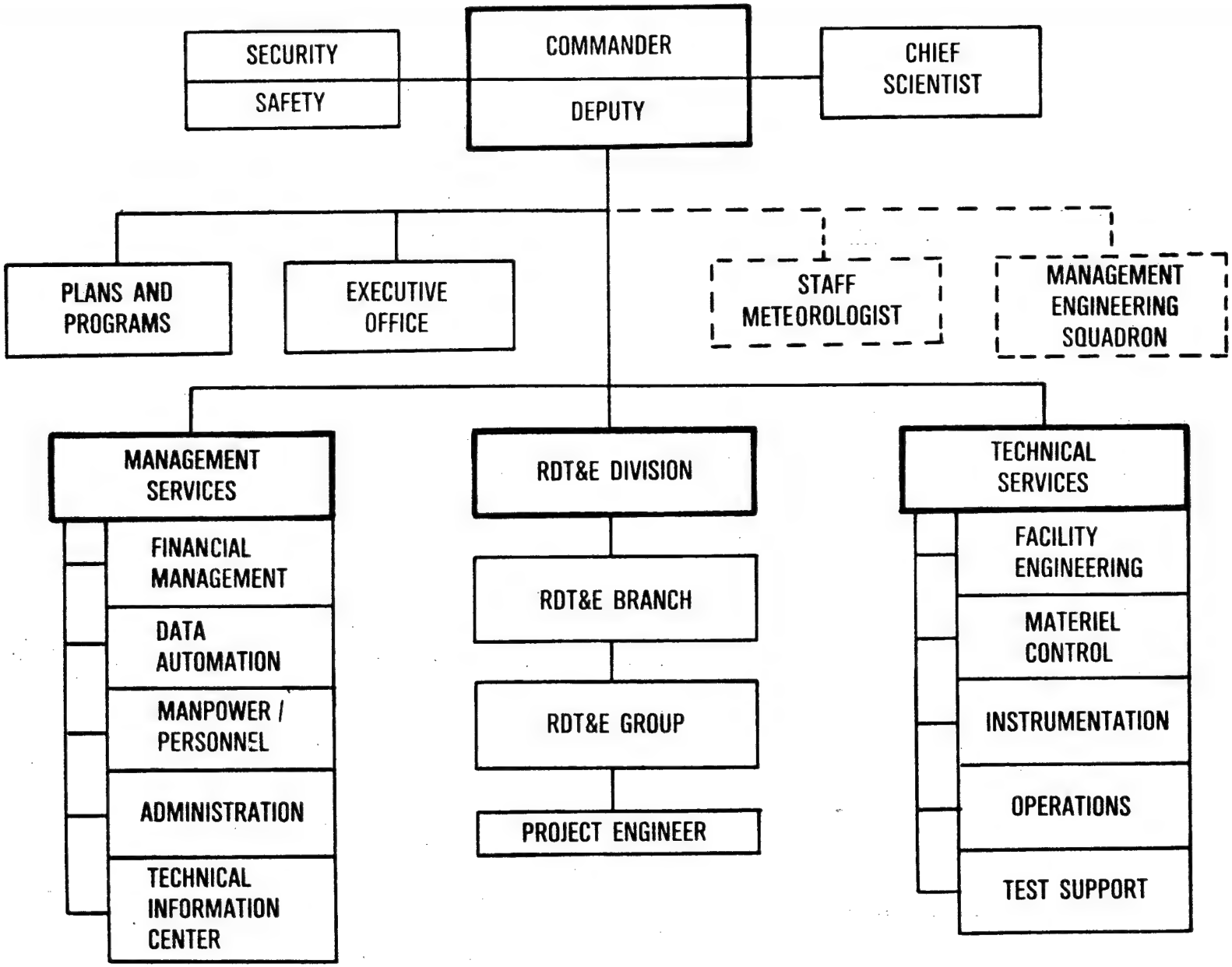


FIGURE 5: REPRESENTATIVE LABORATORY ORGANIZATION

instrumentation, facility operations support and test support. Their primary function is to provide technical support to the line divisions. The line divisions are primarily responsible for the overall laboratory research and development program consisting of basic research, exploratory development, and advanced development with some engineering development. Some organizations participate in special development efforts such as manufacturing technology.

The representative laboratory organization depicted in Figure 5 will be viewed in relation to major business functions and information requirements later in this report. No attempt was made to develop representative mission statements for the various functions depicted in the organizational chart. Any of the many organization and mission regulations required under AFM 23-1 for the laboratories could be used to gain insight into typical missions for these types of organizations.

D. CURRENT MANAGEMENT INFORMATION SYSTEMS

It is beyond the scope of this report to address all of the many management information systems (MISs) currently being used by the laboratories. Most of the organizations interface in some way with a number of standard Air Force or AFSC systems. Some of these standard systems are shown in Figure 6.

1. Financial Management Support Systems

Within AFSC we have two accounting systems. The first is the appropriation accounting system, which is the method used throughout the Department of Defense to provide financial accounting of funds appropriated by Congress. This system simply requires that all funds be accounted for against the funding document that transmitted the funds. The agency responsible for issuing the funding document must be advised of the status

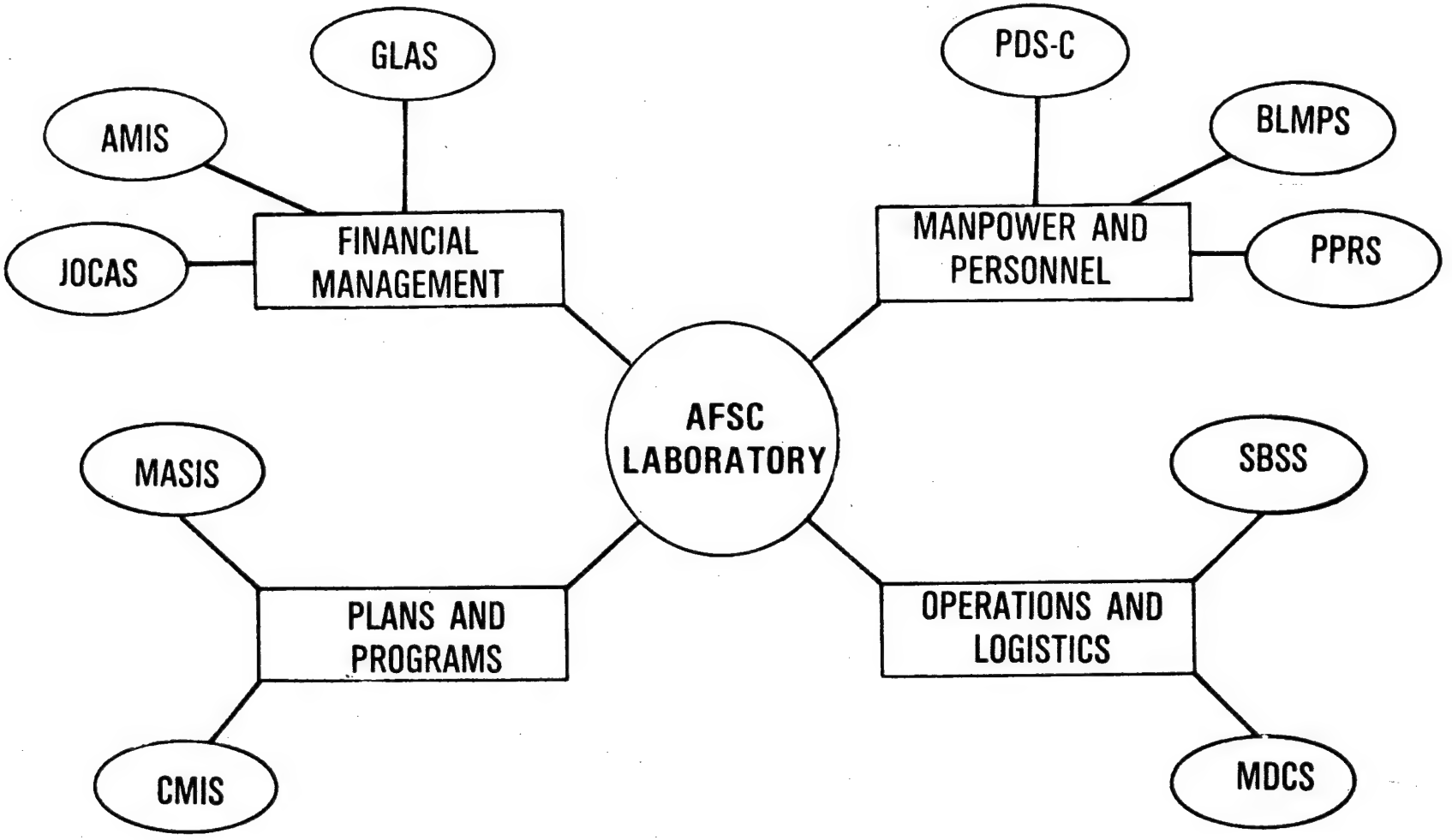


FIGURE 6: STANDARD MANAGEMENT INFORMATION SYSTEMS

of funds (commitment, obligation, and expenditure of funds). In simple terms, a commitment represents a formal administrative reservation of funds; an obligation reflects that the government has incurred a legally binding requirement to fund; and an expenditure represents the disbursement of funds where accrued expenditures are paid. The General Ledger Accounting System (GLAS) supports the appropriation accounting function throughout the Air Force. It is the primary MIS used by the comptroller community to track commitment, obligation, and expenditure of funds. GLAS uses the Burroughs 3500 system and is a highly effective laboratory MIS in those few cases where the laboratory controls the system through its own comptroller function. Historically, GLAS has not been an effective laboratory MIS in those cases where GLAS and the Burroughs 3500 are controlled by some other organization outside the laboratory structure. This is primarily due to loss of flexibility and lack of timely data.

The second accounting system in AFSC was put into operation in 1972 and is called the Job Order Cost Accounting System (JOCAS). JOCAS did not replace appropriation accounting. Both systems are in parallel operation, with each system collecting accounting information for different purposes. JOCAS is an accounting system prescribed by HQ AFSC to satisfy DOD directives and is designed to determine total costs of accomplishing a research and development job. Figure 7 gives some indication of the complexity of the JOCAS process. Since JOCAS is the primary laboratory MIS used to track reimbursements, it is instructive to discuss this system in more detail. JOCAS is designed to accumulate all costs incurred by a laboratory and distribute these costs to specific end products (job orders) and organizations within a laboratory. The basic system is designed to accumulate and report costs, which in most instances are defined to mean

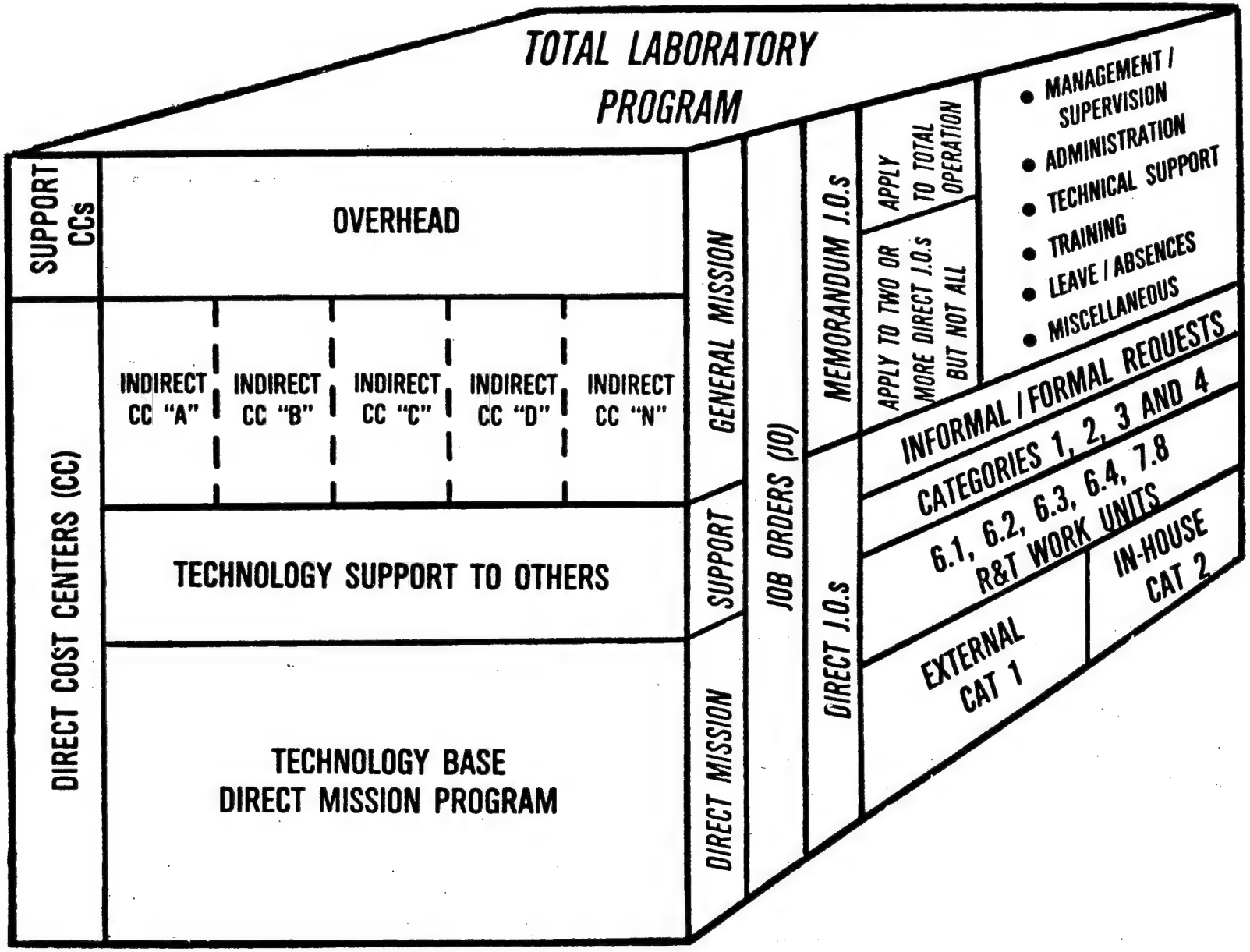


FIGURE 7: THE JOCAS METHODOLOGY

expenditures. The JOCAS does not alter the existing appropriation accounting systems, it merely extracts data from them and reports this data in revised formats by categorizing costs as direct, indirect, or overhead and identifying these costs to job orders and cost centers. Within direct cost centers, costs can be identified as either direct or indirect. Support cost centers are used to identify overhead costs. Overhead costs are tracked against memorandum job order numbers that apply to the total laboratory operation. Indirect costs are tracked against memorandum job order numbers that apply to specific organization groupings (cost centers). Finally, technology base effort and related technical support to others are tracked against direct job order numbers.

The JOCAS was designed to provide significant benefits to laboratory managers. The JOCAS data outputs provide the cost center manager with reports at various levels of detail that identify cost of operation and allocate these costs to job orders. Project managers are provided with reports that reflect the current and year-to-date cost of performing their efforts. The basic objective of the JOCAS is to provide information to assist laboratory managers with the following tasks:

a. Estimate the need for resources required to implement plans.

b. Justify annual requirements for resources.

c. Identify major alternatives and obtain financial information useful in making program decisions.

d. Obtain optimum use of available resources.

Unfortunately the JOCAS suffers from the same problems as other standard systems--lack of understanding, lack of flexibility, lack of timely data, and lack of management emphasis. The latter results in a lack of need to understand the system.

At the DL Business Management Conference held in April 1979, the need for the JOCAS or an equivalent system for cost accounting and reimbursement was affirmed. The JOCAS workshop report, however, emphasized the following points:

a. The standard JOCAS reports are not designed properly for direct use by project engineers. Data must be massaged manually or by further computer processing.

b. There are desires to use the JOCAS for purposes not originally intended. However, there is no practical way to obtain programming support to satisfy local needs.

c. Data accuracy is a problem. During processing, many input errors are detected, particularly in travel, materials, and equipment transactions.

d. Data input and output reports are not timely.

The final recommendation of the workshop members was to use what exists, clean it up, and build on it. In order to accomplish this recommendation, top management support at all levels is required. An additional problem with the system is that financial data is not related to the fiscal year of appropriation, i.e., an FY report is all year monies.

The third system to be discussed under financial management is actually a procurement management system. We have included it under financial management for convenience. An earlier AFSC requirements survey identified a Command-wide procurement management system as a major need. One of the objectives of the Acquisition Management Information System (AMIS) was to provide procurement management data that gives essentially real-time visibility to the progression of procurement actions using on-line terminal devices. AMIS was designed as a modularized expandable

system using System 2000 as the primary data base management system. It is resident on the ITEL computer at Aeronautical Systems Division. Many of the flexibility problems inherent in older standardized systems were addressed and resolved during the development of AMIS.

2. Manpower and Personnel Support Systems

Three systems that are in general use across the Command to support manpower and personnel activities are the Civilian Personnel Data System (PDS-C), the Base Level Military Personnel System (BLMPS), and the Personnel Placement and Referral System (PPRS). The PDS-C provides reports from the Burroughs 3500 that track civilian personnel actions while the BLMPS provides similar reports on military personnel. The PPRS is used to provide summary data on civilians being considered for merit promotion or reassignment. Emphasis on personnel issues, particularly with the introduction of the General Manager Appraisal System (GMAS) and the Job Performance Appraisal System (JPAS), has resulted in a laboratory-wide need for more flexible personnel management information systems. One way of achieving that flexibility is to obtain tapes from existing standard systems and reformat that data to meet local needs. Such an approach is recommended in AFSC policy guidance and several laboratories are currently pursuing this course of action.

3. Plans and Programs Support Systems

There are actually no standard systems that uniquely support the plans and programs function. However, the Command Management Information System (CMIS) has one module supporting VANGUARD, an AFSC planning methodology, and also has modules supporting program assessments. Other CMIS modules support manpower and personnel functions and financial management activities. CMIS is a modern management information systems

concept that emphasizes sharing of data to the fullest extent possible. It is designed to cut across many functional areas in order to provide management information across organizations at the headquarters level. CMIS is in an evolutionary stage and should ultimately integrate all Headquarters AFSC data bases into a common framework.

The Management and Scientific Information System (MASIS) is a specialized system with a flexible retrieval capability that accumulates selected data from the laboratories. It is a centralized, automated data bank for integrating management and scientific information related to AFSC-managed laboratory research and technology. MASIS consists of work unit data and R&D planning data and has an optional feature to track proposal data and laboratory end product data. The system provides an automated interface to the Research and Technology Work Unit Information System (WUIS) managed by the Defense Technical Information Center (DTIC). MASIS currently consists of two major subsystems, one resident on the Honeywell computer at AFSC Headquarters and an immediate access on-line version resident at Aeronautical Systems Division. Recent improvements in MASIS input procedures has improved the timeliness of MASIS data. However, one problem that plagues the system is the data integrity issue. Some laboratories use MASIS data extensively. In those cases the data is pretty good. Other laboratories do not use MASIS at all which results in very poor quality data. The system has the potential of being extremely useful at both the project engineer level and at the headquarters level. However, it takes a comprehensive marketing effort and considerable management attention to achieve that potential. Plans are now being developed to integrate MASIS into the overall CMIS concept.

4. Operations and Logistics Support Systems

Two standard systems used to support the operations and logistics function are the Standard Base Supply System (SBSS) and the Maintenance Data Collection System (MDCS). Both of these systems use UNIVAC 1050 computers. The SBSS is an automated inventory accounting system designed to provide timely supply support to base level activities. SBSS programs and procedures involve base level supply, equipment, munitions, clothing accounts, etc. The system basically consists of four major processes: item accounting, accounting and finance, file maintenance, and management reporting. The MDCS is a system that primarily supports base Precision Measuring Equipment Laboratories (PMEL) and indirectly affects the laboratories through their PMEL support. The system tracks calibration schedules and maintenance data for equipment used to support laboratory in-house research and development.

Studies conducted by various laboratories concerning the in-house research and development environment indicated continual frustration with the supply function in support of research. Many reasons were noted for this frustration. However, in simplified terms, the supply system is so complex and cumbersome that scientists and engineers generally cannot use the system effectively. Recently, Headquarters Air Force initiated an effort to develop a Logistics Information Management Support System (LIMSS). LIMSS is being formulated as a means to tie all logistics MIS planning into a compatible framework. As part of the effort, it will be necessary to evaluate existing information flows and management processes. The laboratories need to take an active role in the LIMSS program in order to recommend improvements in those logistics processes that impact the laboratories.

The previous information only briefly describes some of the many standard MIS in use by the laboratories or organizations supporting the laboratories. In order to augment the capabilities of these systems or add much needed flexibility at the laboratory level, many R&D organizations have implemented or are implementing locally unique MIS. Figure 8 lists some of these unique systems in tabular form. The numbers in the columns indicate the order in which automated management information systems have been implemented, are being implemented, or plan to be implemented at the respective organizations. As a result of the quarterly meetings of the Laboratory IRM Management Working Group, a great deal of technology exchange is taking place among the laboratories. This technology exchange is essential in order to benefit from lessons learned and evolve to a compatible and integrated approach to MIS for all organizations covered under this project. This does not imply standardization of hardware and software, but does imply standard data definitions as well as standard interface networks.

	AFATL	AFESC	AFGL	AFOSR	AFRPL	AFWAL	AFWL	AMD	LOC	RADC
MAJOR EMPHASIS AREAS	AFMIS			AIDS	RMIS	CAMIS		AMDMIS	HRL	LONEX
PLANS / PROGRAMS	5	5	7	4	5	4	5	6	3	4
PROGRAM MANAGEMENT	7	2	6	3	1	3	4	7	–	1
WORK UNIT TRACKING	2	3	5	6	4	7	7	4	1	6
PROCURMENT / CONTRACTS	4	6	3	2	–	2	2	3	2	2
LOGISTICS MANAGEMENT	6	7	4	–	3	5	6	5	–	–
BUDGET / FINANCE	1	1	1	1	–	1	3	2	4	3
MANPOWER / PERSONNEL	3	4	2	5	2	6	1	1	5	5

FIGURE 8: LABORATORY UNIQUE MIS

III. MAJOR BUSINESS FUNCTIONS

In order to develop a common framework to compare information requirements submitted by the product divisions, test centers, and laboratories, the lead organizations agreed to use the business function concept proposed by SAMTO. One of the first problems we faced was to decide what constitutes a business function. Some of the early discussions emphasized business functions such as implementing policy, managing and supervising, budgeting and allocating, estimating and pricing, prioritizing and ranking, etc. This view of business functions was not consistent with the business function definitions being used by the centers and product divisions. Finally, after considerable discussion, the laboratories decided on twelve major business functions. These functions are shown in Figure 9.

A. CORPORATE PLANNING

Corporate planning involves the process of developing corporate goals, objectives and long range strategies in consonance with AFSC corporate guidance. In developing broad goals, strategies and priorities, corporate planning encompasses people, facilities, programs, funding, organizations and methodologies. It provides a forum to focus corporate knowledge and experience toward integrating an organization's activity to accomplish overall corporate goals. Some organizations have separate corporate planning staffs reporting directly to the Commander while others have integrated the corporate planning activity into conventional plans and programs staff offices. This function takes place in the Plans and Programs office in our representative laboratory shown in Figure 5.

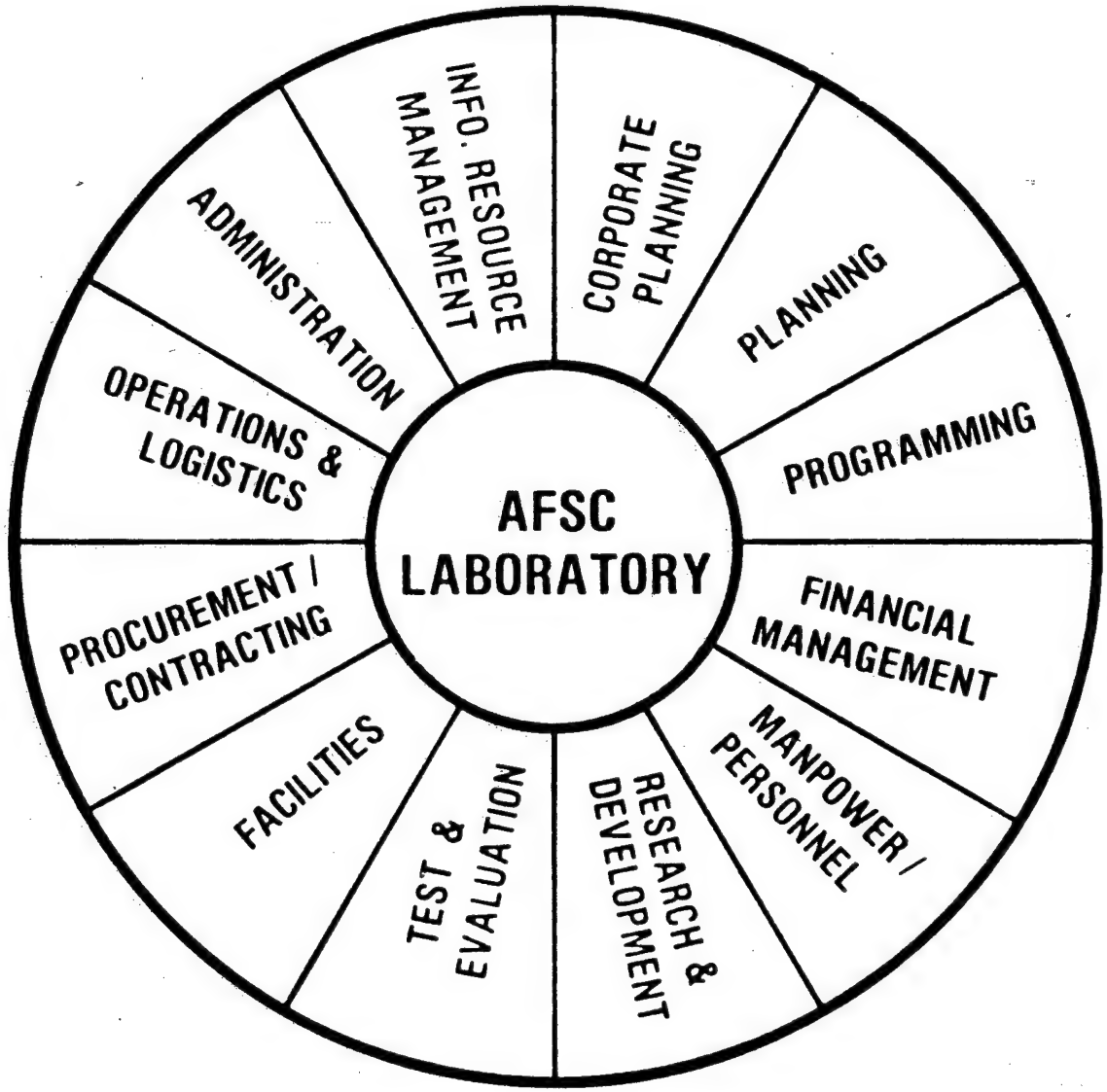


FIGURE 9: MAJOR BUSINESS FUNCTIONS

B. PLANNING

The planning function cuts across all organizations. It involves assessment of technology needs, required operational capabilities, historical program data, etc. to effectively identify major technical goals and major integrated program thrusts, to ensure technology transition and to effectively utilize available foreign technology. The major planning function takes place in plans staff offices and in line organizations. Staff plans offices are generally responsible for integrating line planning efforts into a cohesive laboratory plan. They derive strategies and monitor the transition of technology and development products to the AFSC product divisions and MAJCOMS.

C. PROGRAMMING

The programming function provides surveillance and assessment of technical programs to ensure that all efforts are efficiently managed, productive, and responsive to Air Force needs. This function takes place in both line and staff organizations. Most R&D organizations have programs staff offices that develop procedures and guidance for line program managers, coordinate technical program reviews, and provide continual surveillance of high interest technology items for the Commander. Some programs functions also include primary responsibility for Congressional inquiries, other headquarters/agency investigations and interfaces with the civilian sector. Some organizations use their programs offices for technical program quality assurance evaluations.

D. FINANCIAL MANAGEMENT

The financial management function includes budget preparation, resource estimation, funds allocation, forecasting, and reprogramming. Other areas involved in the financial management function are cost

estimation, cost reporting, cost analysis, program acquisition, cost accounting, and manhour accounting. The financial management function is integrated into the activities of every staff and line organization in a laboratory. Project engineers have primary responsibility for the financial management of their programs whether in-house or contracted. Group leaders, branch chiefs, division chiefs, staff office chiefs, etc. all have varying degrees of financial management responsibility. Financial management staff offices generally integrate all financial management activities for a laboratory. They provide financial management visibility and advice on the status of financial resources and provide and interface between line organizations and comptroller activities. They are also required to retain historical files of prior financial activity.

E. MANPOWER AND PERSONNEL

The manpower and personnel function involves all matters pertaining to manpower, organization, and personnel management. This business function involves various activities such as career development, training, awards, EEO programs, personnel placement, etc. The manpower and personnel function is part of the activities of every supervisor in an organization. Generally, laboratories have centralized manpower and personnel offices that provide direction, control, and analysis of manpower and personnel requirements and utilization. These central offices serve as an organizational contact point for Management Engineering Teams (MET) and the Civilian and Military Personnel Offices.

F. RESEARCH AND DEVELOPMENT

The research and development function involves all scientific and technical activities related to our technology development efforts. Laboratory scientific and engineering personnel serving as project or

program managers for both contracted and in-house efforts are primarily involved in this function. Numerous efforts are included under the research and development function. They include such diverse activities as state-of-the-art assessments, preparation of technology coordinating papers, technical review and evaluation of contractual and in-house programs, analytical studies in the area of basic research, exploratory development, etc. The research and development business function as defined in this report is primarily a line organization responsibility.

G. TEST AND EVALUATION

The test and evaluation function involves testing, evaluation of data, preparation of test plans and reports, etc. The test and evaluation function can take many forms dependent on the specific organizational structure of the laboratory involved. In most laboratories, the test and evaluation function is integrated into R&D line organization activities. Some organizations have included a test and evaluation function in their technical services divisions. One organization has set up a centralized test and evaluation office to manage and control all major ground and flight test programs. Their function includes the development of integrated plans and forecasts of test support requirements as well as the verification of cost effective utilization of program test support resources. In our representative laboratory, the testing and evaluation function occurs in the line divisions and in the technical services division.

H. FACILITIES

The facilities function involves the planning, build-up and modification of laboratory facilities and test equipment. Long range planning, programming, implementing and tracking of military construction

programs fall under this business function. The facilities function includes general support to laboratory in-house RDT&E programs including data acquisition, instrumentation, calibration, and maintenance. In some laboratories, facilities are managed and controlled by line division organizations while in others all facilities support has been consolidated in the technical services division. In our representative laboratory, the facilities support function is primarily contained in the technical services division.

I. PROCUREMENT/CONTRACTING

The procurement and contracting function includes the preparation of purchase requests, proposal evaluations, and all other facets of the procurement and contracting process. Most laboratories rely on other organizations for their procurement and contracting support. However, there is a great deal of interface activity associated with the procurement and contracting function. There is considerable overlap between the financial management function and the procurement and contracting function. As in the case of the financial management function, procurement and contracting cuts across all organizations in a laboratory. Initial cost estimating, contract cost analysis, and contract data management all play a key role in the procurement and contracting business function.

J. OPERATIONS AND LOGISTICS

The operations and logistics business function includes the areas of supply, equipment, and transportation support for laboratory organizations. This function includes activities associated with acquisition support through requisition of all supplies and equipment, material handling, inventory control and equipment management. Surveillance of all laboratory custodial accounts are included as part of this business function. In most

laboratories, this function is part of a centralized technical services organization.

K. ADMINISTRATION

The administrative function involves a diverse number of activities such as communications management, publications and forms management, documentation, publication libraries, printing, etc. The function plays a role in all organizations; however, most laboratories have central offices that provide administrative support for their organizations. Some administrative offices report directly to the Commander while others have been integrated into larger services organizations.

L. INFORMATION RESOURCE MANAGEMENT

In the strict sense, information resource management (IRM) is not a major business function in today's laboratory environment. This area is only now receiving recognition. However, we chose to include IRM as a major business function in order to highlight the role of IRM in the future. IRM involves the coordination of many functions in order to handle information in an intelligent and cost effective manner. In a simplistic sense, all data in an organization is a resource and that resource must be managed effectively. Information resource management is an overall process that allows us to combine data into meaningful information in a cost effective way with minimum duplication of effort. Figure 10 describes the various activities involved in the IRM process. No laboratory organization has developed a unique office for IRM. Most of the organizations have included IRM as a part of their data automation function. Therefore, for purposes of discussion in this report, the IRM business function includes not only the coordination activities associated with IRM, but also the automatic data processing support activities and the data administration

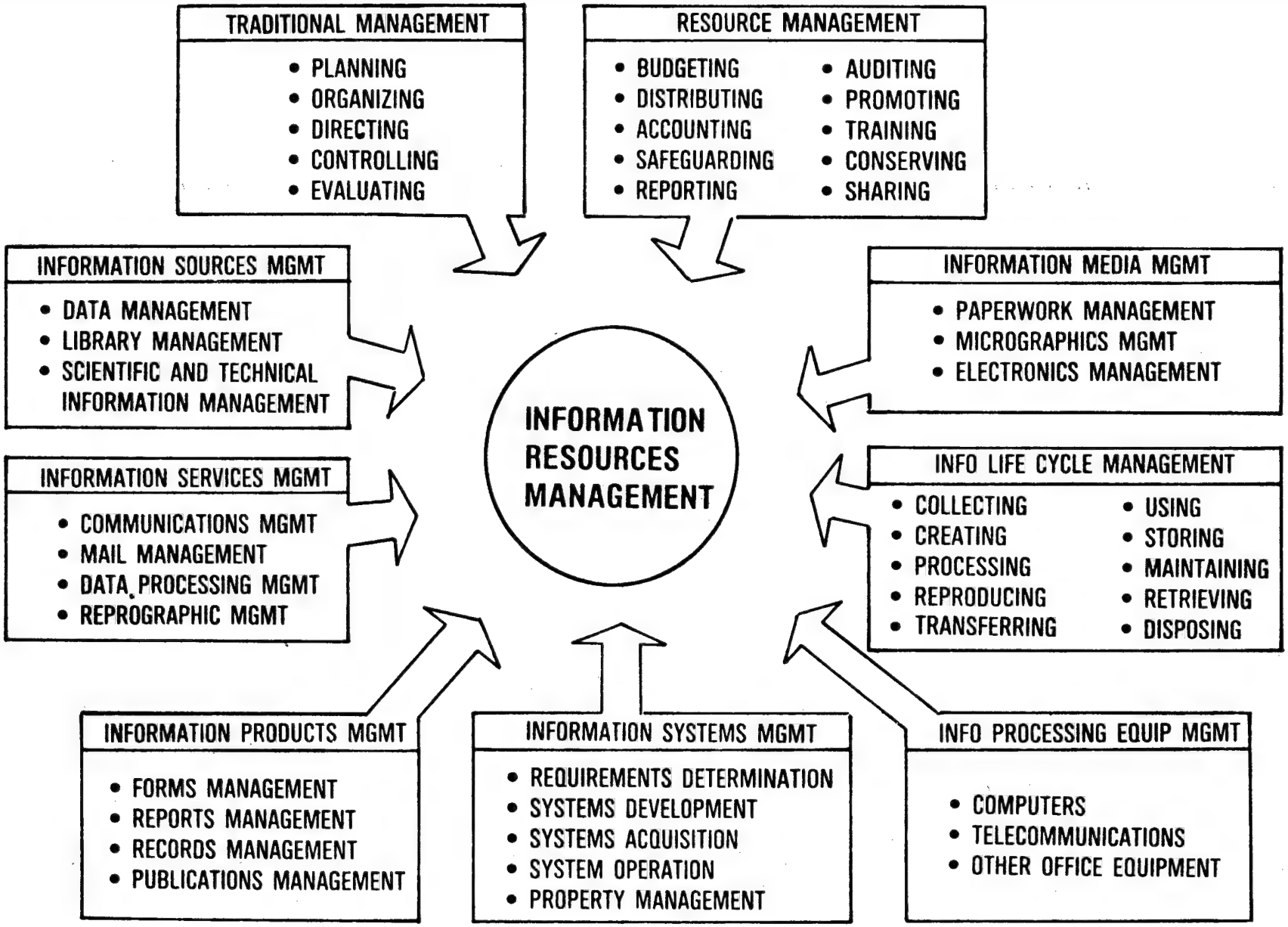


FIGURE 10: ACTIVITIES COORDINATED THROUGH THE IRM PROCESS

function activities. The data administration activities include implementing command policy relative to information management; establishing local corporate data policies and procedures; ensuring understanding, acceptance, and enforcement of data policy; and ensuring integrity and control of all management data. All of these activities play a major role in the IRM process. One of the first priorities in any IRM program is to clearly define information requirements. The remainder of this report addresses itself to that specific goal.

IV. INFORMATION REQUIREMENTS

The process of identifying the information needs of large complex organizations is a difficult one. We have attempted to solve this task in several ways. One way involves a "bottom-up" approach. In this approach, current information processes are examined and this information is augmented by interviewing personnel at all levels of the organization. Many of the available information requirements studies used this method. This approach tends to result in a shopping list of information needs. The second way involves a top-down approach using critical success factors. This technique is described thoroughly in Appendices A, D, and E and will be overviewed later in this section.

For the purposes of this study, specific information products and needs were identified and categorized according to major business functions. They were then analyzed to determine their information class, information type, and relative priority. Information class represents a collection of information all dealing with the same general functional area such as safety, budget, accounting, etc. Information type indicates whether the information is operational, tactical, or strategic information.

Operational information is concerned with structured and repetitive activities that are measurable in achieving specific results. The use of operational information allows line management to measure performance against predetermined results. The feedback from analysis of operational information keeps higher level management aware of unfavorable as well as favorable results. Tactical information involves a relatively near-term view and is primarily used by middle management to implement strategic plans at functional levels. Strategic information is used by top

management and their staff and covers a relatively long time span. This type of information is used for planning purposes and for analysis of problem areas to discover the underlying reasons for specific problems or situations.

Strategic planning concerns itself with the establishment of objectives and policies that will govern the acquisition, use, and disposition of the resources needed to achieve those objectives. It is normally conducted at the highest level of management and at a very broad level of detail. Effective strategic planning requires large amounts of information derived from or relating to areas of knowledge outside the organization. Generally, corporate plans offices are the focal point for this type of activity in typical AFSC laboratory organizations.

The relative priority of information needs was determined by the field data administrators in conjunction with key laboratory personnel. These priorities were assigned simply for guidance and should not be viewed as absolute. The detailed results of the bottom-up analysis are presented in Appendix C.

A. OVERVIEW OF LABORATORY INFORMATION NEEDS

As previously mentioned, information needs were identified in terms of operational, tactical, or strategic requirements. Figure 11 gives a visual picture of the relationship of these three types of needs. Classically, operational information is primarily used at lower levels in an organization; tactical information is oriented toward middle management; and strategic information is developed and used by top level management. If you turn the triangular shape upside down, you can see what happens when top level management gets too concerned with operational information. The whole system becomes unstable. This does not imply that top level

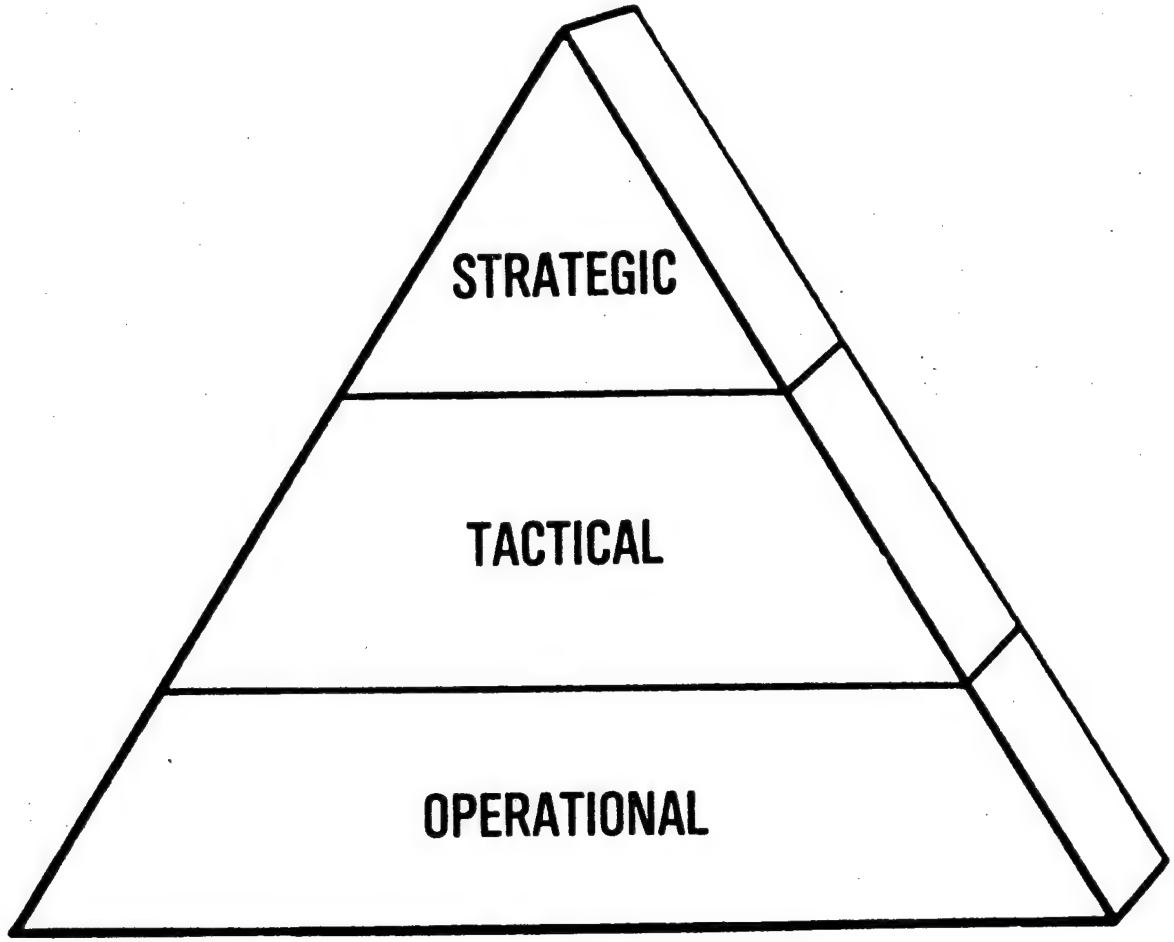


FIGURE 11: LABORATORY INFORMATION NEEDS

management should never be concerned with operational information. It does imply that each management level should maintain a balanced information perspective and emphasize the type of information oriented to that level.

Figures 12, 13, and 14 describe the relationship of operational, tactical, and strategic information to major business functions. For example, in the case of manpower and personnel, a typical information need at the operational level would be individual personnel records. This represents a day-to-day operational need for every supervisor in an organization whether a top executive or first line supervisor. A comparable tactical need in this area would be a position management plan. Such a plan would primarily focus on manpower and personnel issues one to three years out. These plans involve expected vacancies, promotions, rotation assignments, etc. Finally, a strategic need related to the operational and tactical needs involves the determination of projected manpower and skill mix. Before we can satisfactorily answer this need, a good deal of strategic planning must have taken place. The strategic plan would address expected mission changes, business environment changes, etc., and would provide the basis for identifying future manpower and skill mix needs. Technology forecasts, development planning, DOD and Air Force guidance and major thrust selection all impact the strategic manpower plan.

A similar type of analysis can be made for each of needs identified in Figures 12, 13, and 14. Appendix C addresses individual needs in more detail.

B. HEADQUARTERS DL INFORMATION NEEDS

During the period of this study, HQ AFSC/ACDI conducted a parallel study of the information needs of all headquarters staff offices including HQ AFSC/DL. The results of their analysis are included in order to avoid a

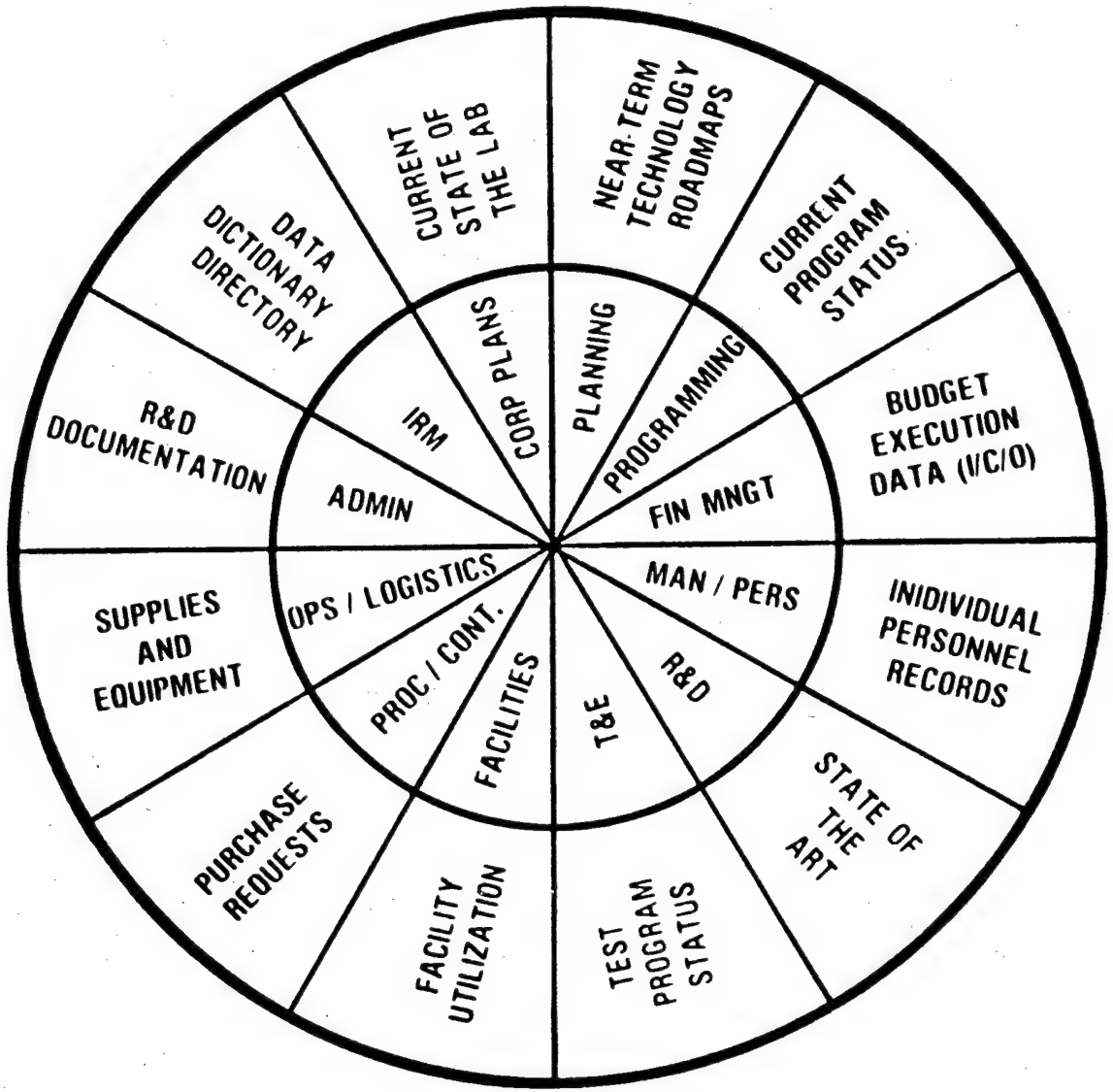


FIGURE 12: OPERATIONAL INFORMATION NEEDS

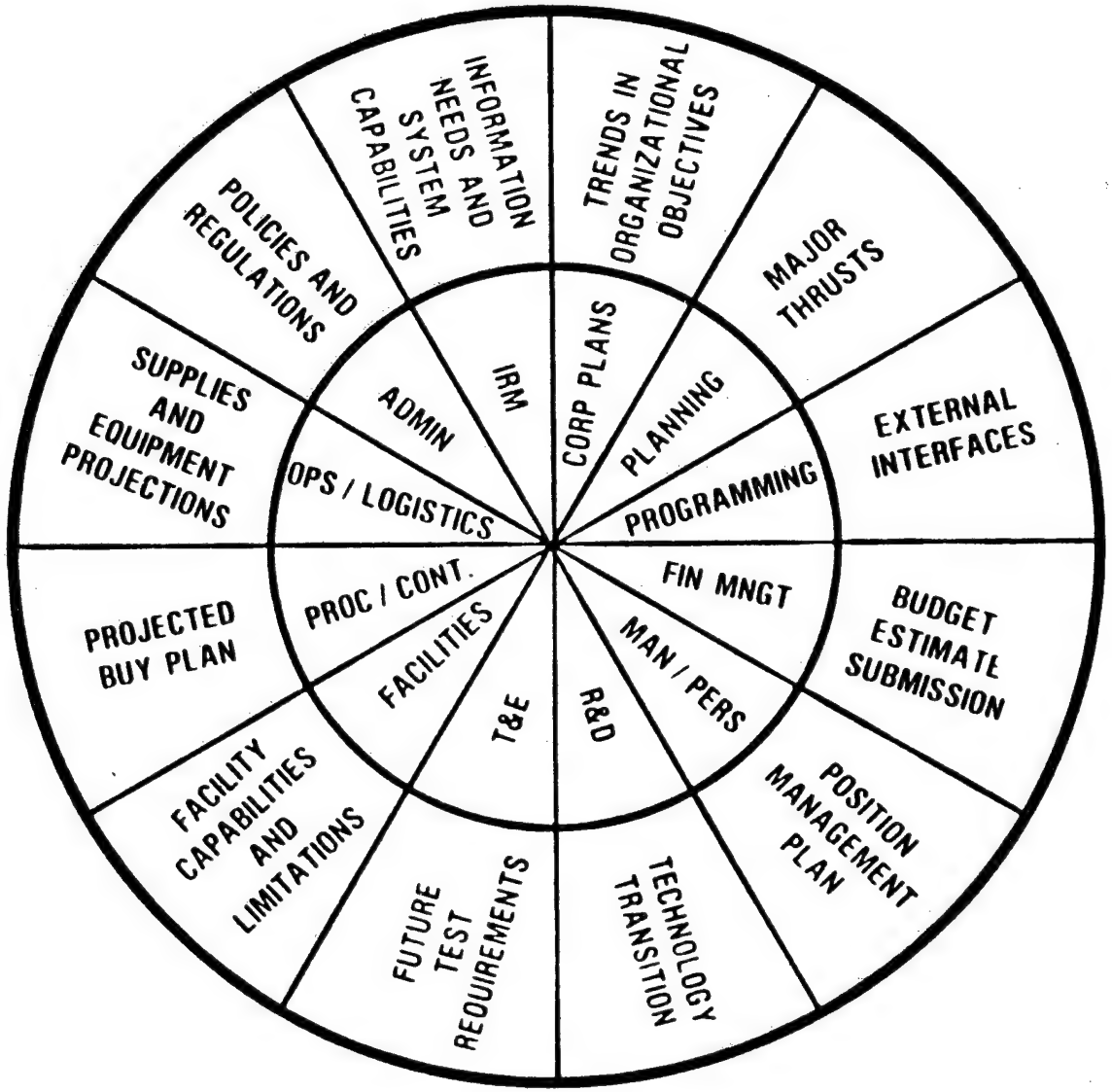


FIGURE 13: TACTICAL INFORMATION NEEDS

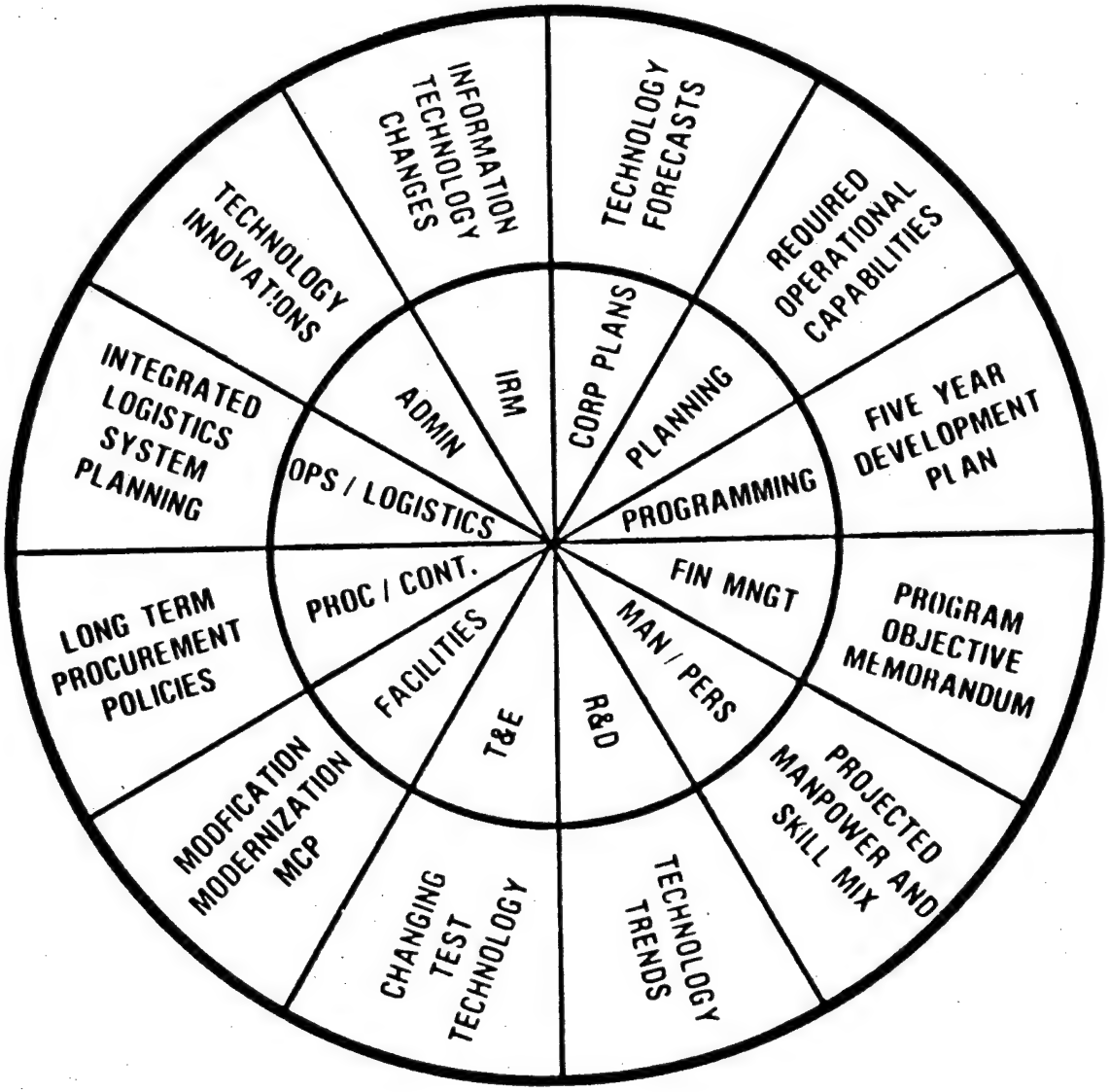


FIGURE 14: STRATEGIC INFORMATION NEEDS

duplication of effort. DL information requirements can be grouped into two broad areas, general status and planning.

The general status area contains information associated with work units and appropriations. The existing MASIS capabilities give retrospective information which is useful for the work and status associated with particular efforts. It is frequently used to answer questions on overrun conditions. In general MASIS does a creditable job of supporting ad-hoc requests for information on work units and can serve as a "model" for defining such requirements. Current program execution information is obtainable from CMIS-LS which has a high level of user acceptance. One of the most useful pieces of information from CMIS-LS is the graphical report of forecast versus actual obligations and expenditures. Summary information on manning and program manager's assessments by program element are other high use items. In general CMIS-LS represents a hard minimum requirement for DL, and existing capabilities should be maintained while improving the operational utility and reducing the administrative load associated with data transfer within the system. The above information needs to be supplemented with general accounting data at the project, task and program element detail level to assist with reporting actions. Update of general accounting information into the basic system is a high priority enhancement. The use of standardized definitions is essential to successfully implement this enhancement.

DL utilizes planning information to prepare and consolidate the laboratories' inputs for the VANGUARD planning process. These inputs take the form of "Technology Thrusts." During the POM and BES cycles financial and track data are needed for all three main stages, i.e., field generation

of inputs, Headquarters AFSC prioritization of requirements and HQ USAF/DOD review of proposals. Historical data are essential in the planning, programming, budgeting system (PPBS). Trend data as far back as ten years have been used in the past to support programming efforts. Although CMIS-LS does not contain information which supports the PPBS process, provisions for its inclusion have been made in the design to include the definition of specific reports. A means of relating Headquarters AFSC's Decision Program Sets to Headquarters USAF's Program Decision Packages is also needed.

A significant need exists to permit planning information generated in the field to be transmitted to Headquarters AFSC and then handled conveniently during the subsequent consolidation and prioritization. Narrative descriptions should be included with financial data. Full text searches of the narrative description would be an extremely useful feature. An automated capability will allow the PEG and Mission Area Panels to more readily work with "cut-up" field inputs. Such an automated capability should fully support classified processing with direct access by those individuals involved in the planning process. Throughout the year planning information needs to be available for "what if" inquiries, technological breakthroughs and fact-of-life changes. Such ad-hoc requests need to identify specific impacts at work unit and task level. System Officers' (SYSTOs') greatest interests are in funding data and progress status. Additionally, organizational information and contacts list are frequently used information sources.

C. LABORATORY CRITICAL SUCCESS FACTORS

The Critical Success Factors (CSF) method covered in Appendices A, D, and E provides an excellent way to focus in on an organization's true

information needs from the top down. Figure 15 describes a number of key organizational goals and associated critical success factors. Table 1 presents a number of subjective measurements that can be used in conjunction with critical success factors to track progress toward achieving key organizational goals.

A comparative analysis between the information contained in Figure 15, Table 1, Appendices D and E, and the information contained in Appendix C yields interesting results. The vast majority of the information needs identified in the bottom-up approach address day-to-day operational problems. Effectively satisfying these needs will not necessarily provide management with the type of information needed to track critical success factors or achieve key organizational goals.

D. INFORMATION SYSTEM CONSIDERATIONS

In order to be effective, an information system must interface with all facets of the information processing business in an organization. Management information systems, productivity enhancement tools, electronic mail, communications systems, copying/printing facilities, library facilities, etc. must all be coordinated together in a strategic long range plan. Within the R&D community, this strategic planning is being coordinated through the laboratory IRM Management Working Group. Several technology experiments are being conducted at various organizations to demonstrate technology applicable to the IRM process. Three key efforts are the Laboratory Office Network Experiment (LONEX) at RADC, the Laboratory Operations Center (LOC) at AFHRL and the Automated Information and Documentation System (AIDS) at AFOSR.

1. The LONEX involves a network of computers, terminals, and stand alone or telecommunicating word processors that places user friendly data

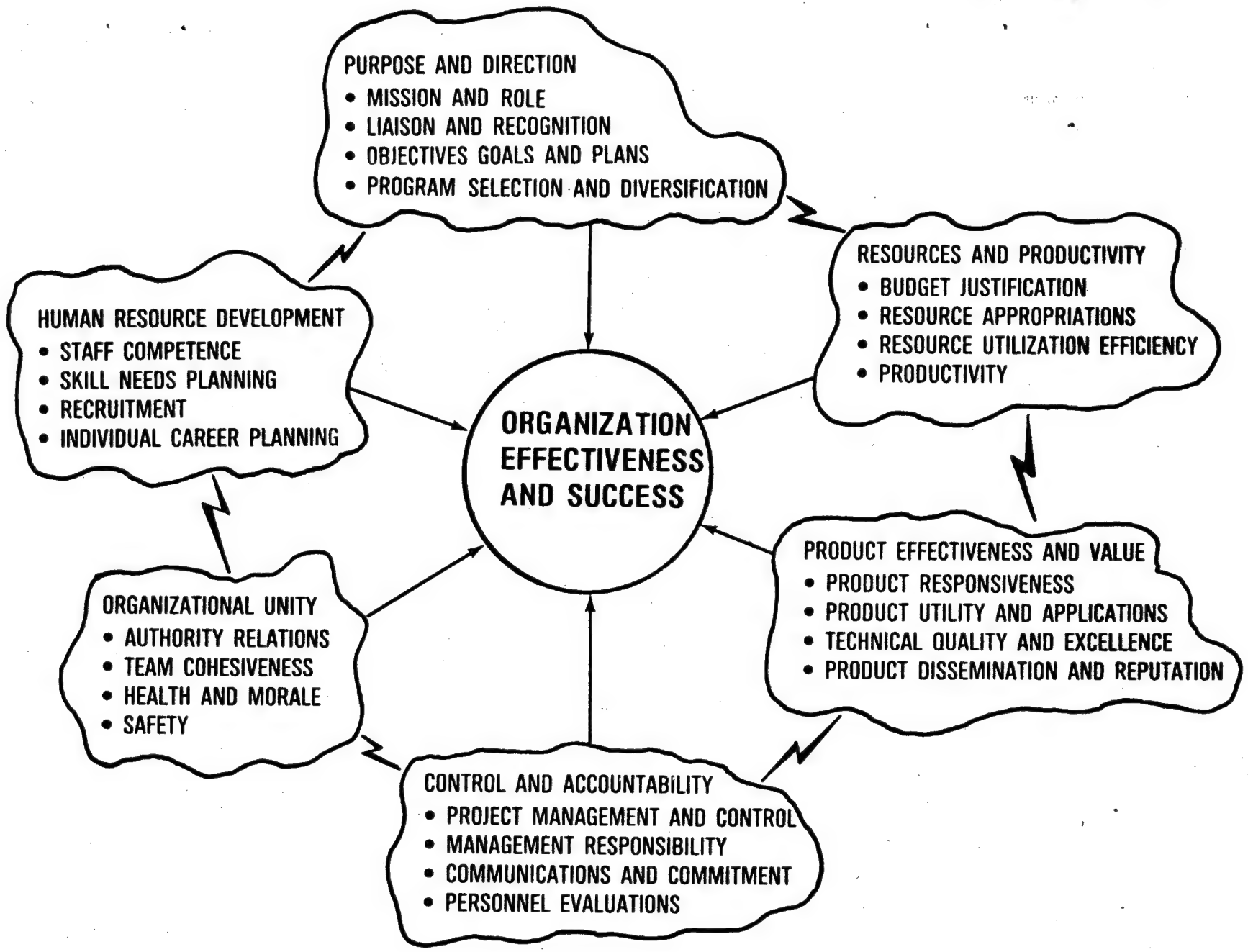


FIGURE 15: GOALS AND CRITICAL SUCCESS FACTORS FOR GOVERNMENT RESEARCH AND DEVELOPMENT ORGANIZATIONS

GENERAL GOAL	CRITICAL SUCCESS FACTOR/SUBJECTIVE MEASUREMENT FACTOR
PURPOSE AND DIRECTION	MISSION AND ROLE - Establishment, by top management, of a sense of purpose and direction for the laboratory. Provision of a sense of focus for programs. - Impact of laboratory contributions on AFSC/Air Force plans and programs and on industry. - Increased knowledge and perception of all important technical activities, state-of-art, techniques and analysis, and processes which are ongoing in the technical community to guide laboratory activities.
PURPOSE AND DIRECTION	LIAISON AND RECOGNITION - Acknowledgement of laboratories' role and contribution in RDT&E by the Secretary of the Air Force and Congress. - Increased approval of proposed plans, projects and budgets through liaison with key decision makers. - Improved comprehension of laboratory organizations with a clear view of their future. - Increased RDT&E recognition of contributions. Accolades, awards, and letters of thanks and praise received from customers and the technical community for recognition of exemplary work and contributions.
PURPOSE AND DIRECTION	OBJECTIVES, GOALS, AND PLANS - Ability to anticipate long range technology needs of department and plan accordingly. Identification of specific major issues to be addressed and pursuit of new opportunities. - Increased sensitivity to and perception of important issues being considered and the objectives of the key decision makers. - Increased planning and strategy coordination between laboratories and headquarters for developing integrated plans to attain synergism through effective and efficient joint programs. - Endorsement and support by headquarters of the laboratories' long range plan objectives. - Clarification of objectives and goals for improved management orientation and focusing on right set of key decisions.

TABLE 1: GENERAL GOALS, CRITICAL SUCCESS FACTORS AND SUBJECTIVE MEASUREMENTS

GENERAL GOAL	CRITICAL SUCCESS FACTOR/SUBJECTIVE MEASUREMENT FACTOR
PURPOSE AND DIRECTION	PROGRAM SELECTION AND DIVERSIFICATION - Develop a current overview of entire national and international technological environment to guide laboratory actions. - Develop and improve procedures and criteria for individual project evaluation and selection consistance with Air Force needs. - Percent of laboratories' total funding and labor level on new high priority projects inspired by long range plans and program development proposals. - Potential impact of new program work on major issues facing the Air Force.
RESOURCES AND PRODUCTIVITY	BUDGET JUSTIFICATION - Increased resources to expand role. - Increased funding to improve capabilities and services.
RESOURCES AND PRODUCTIVITY	RESOURCE APPROPRIATIONS - Consistency of resource allocations in proportion to task importance and/or priority.
RESOURCES AND PRODUCTIVITY	RESOURCE UTILIZATION EFFICIENCY - Effective and efficient utilization of resources, in delivery of satisfactory work products within negotiated resources and schedule. - Savings in time, cost, and/or manpower for on-going projects with work product quality meeting or exceeding quality expectations. - Improvement in ratio of effective direct labor and indirect labor. - Improved and timely resources tracking to surface latent problems.

TABLE 1: GENERAL GOALS, CRITICAL SUCCESS FACTORS AND SUBJECTIVE MEASUREMENTS (CONTINUED)

GENERAL GOAL	CRITICAL SUCCESS FACTOR/SUBJECTIVE MEASUREMENT FACTOR
RESOURCES AND PRODUCTIVITY	PRODUCTIVITY - Identification of productivity "bottlenecks" to focus on problems and concentrate corrective actions. - Minimum impact on technical/managerial staff, and improved real productivity, as a benefit of streamlined and coordinated management information systems and administrative data gathering. - Increased number of projects for same level of in-house manpower, meeting schedules and costs with work product quality meeting or exceeding expectations.
PRODUCT EFFECTIVENESS AND VALUE	PRODUCT RESPONSIVENESS - Increased responsibility on those projects which address major issues and/or needs. - Frequency of requests for technical assistance by the technical community. - Feedback on customer satisfaction on performance per negotiated work products deliverable for given resources.
PRODUCT EFFECTIVENESS AND VALUE	PRODUCT UTILITY AND APPLICATIONS - Integration of laboratories' long range technical plans into other government agency/industry long range plans. - Transition of laboratory technology into defense systems. - Transition of laboratory technology into the commercial sector.
PRODUCT EFFECTIVENESS AND VALUE	TECHNICAL QUALITY AND EXCELLENCE - Capability of laboratory to draw upon experience and technical knowledge and apply it to high priority programs. - Credibility of staff, technical competence, operational awareness, and versatility for addressing key technological problems. - Funds received from outside organizations to expand long range plans and pursue front end program development activities.

TABLE 1: GENERAL GOALS, CRITICAL SUCCESS FACTORS AND SUBJECTIVE MEASUREMENTS (CONTINUED)

GENERAL GOAL	CRITICAL SUCCESS FACTOR/SUBJECTIVE MEASUREMENT FACTOR
PRODUCT EFFECTIVENESS AND VALUE	PRODUCT DISSEMINATION AND REPUTATION - Improvement in performance on high priority programs assigned to the laboratory as a result of technical interchange, data sharing, and mutual working relationships with other government R&D centers. - Improved visibility of contributions to major projects.
CONTROL AND ACCOUNTABILITY	PROJECT MANAGEMENT AND CONTROL - Decrease in negative variance from target schedules, manyears of effort and costs for each project and disciplinary group. - Frequency of milestones missed and accompanying management action to improve future performance. Improved control and accountability solution to minimize milestone slippages. - Feedback and attitudes regarding performance obligations on projects. Amount of senior management time required to correct problems regarding project performance.
CONTROL AND ACCOUNTABILITY	MANAGEMENT RESPONSIBILITY - Acceptance of responsibility for discharging management functions by all managers, to improve total operation. - Increase of decision making on more important matters throughout management hierarchy. - Decrease in number of minor matters coming to Commander/Director for resolution.

TABLE 1: GENERAL GOALS, CRITICAL SUCCESS FACTORS AND SUBJECTIVE MEASUREMENTS (CONTINUED)

GENERAL GOAL	CRITICAL SUCCESS FACTOR/SUBJECTIVE MEASUREMENT FACTOR
CONTROL AND ACCOUNTABILITY	COMMUNICATIONS AND COMMITMENT - Clarity of top-down communications of laboratory's goals and guidance on priorities for major programs. - Timely, unfiltered top-down communications on policies, directives, and other significant information. - Commitment and sustained interest of top management on major issues and programs. - Effectiveness of transmission of pertinent technical information into the decision support systems of key decision makers. - Frequency of missed milestones because of lack of information to exercise proper management controls.
CONTROL AND ACCOUNTABILITY	PERSONNEL EVALUATION - Number of top management interventions required because of dissatisfactions resulting from a lack of the discharge of management responsibilities within the organization. - Revised performance appraisals to indicate accountability for performance relative to discharge of management functions.
ORGANIZATIONAL UNITY	AUTHORITY RELATIONS - Improved management control through effective lines of responsibility on program assignments within the organizations. Top-down perspective of the accountability structure and well identified authority relations. - Achievement of a strong sense of common purpose through enthusiastic participation by senior management in long range planning, coordinated program development, and critical problem solving for the Air Force. - Initiative, responsiveness and effectiveness of the manager's actions and approaches to achieve laboratory goals. - Willingness of senior management to "pull together" in interpreting and implementing objectives assuring top-down and bottoms-up communication, and discharging managerial duties with proper delegation of responsibilities.

TABLE 1: GENERAL GOALS, CRITICAL SUCCESS FACTORS AND SUBJECTIVE MEASUREMENTS (CONTINUED)

GENERAL GOAL	CRITICAL SUCCESS FACTOR/SUBJECTIVE MEASUREMENT FACTOR
ORGANIZATIONAL UNITY	TEAM COHESIVENESS - Effective team building, leadership, and demonstration of initiative and innovation by senior management in responding to high priority major issue programs and problems. - Willingness of staff to "pull together" by prioritizing their personal goals consistent with the best interest of the laboratory. - Improved productivity of staff through an enthusiastic and cohesive "can do" attitude, commitment to the "team," and desire to extend self for the job. - Improved interlaboratory productivity resulting from cooperation, support, and commitment among laboratories.
ORGANIZATIONAL UNITY	HEALTH AND MORALE - Technical/staff productivity, enthusiasm, esprit de corps, and bottoms-up feedback to reaction to supervisors' initiative, leadership, and discharge of expected responsibilities. - Increased enthusiasm demonstrated by initiative and motivation of staff members, particularly leaders, towards accomplishment of laboratory goals. - High morale and healthy attitudes of staff toward work responsibilities with the interest of improving the well-being of the laboratory through high individual effort and enthusiasm.
ORGANIZATIONAL UNITY	SAFETY - Increased safety through improved quality control, maintenance, reliability, and testing. - Correction of safety oversights and critical review of safety plans. - Reduced accidents and incidents through improved risk assessments and precaution recommendations.

TABLE 1: GENERAL GOALS, CRITICAL SUCCESS FACTORS AND SUBJECTIVE MEASUREMENTS (CONTINUED)

GENERAL GOAL	CRITICAL SUCCESS FACTOR/SUBJECTIVE MEASUREMENT FACTOR
HUMAN RESOURCE DEVELOPMENT	STAFF COMPETENCE - Ability to exploit unanticipated opportunities. - Personnel recognized as national/international experts in a technology area. - Technical successes resulting from in-house research.
HUMAN RESOURCE DEVELOPMENT	SKILL NEEDS PLANNING - Closure of the gap between requisite future skills and current resident skills. - Improvement of capabilities in unique "areas of expertise" with requisite skills to address major issues of importance to the Air Force.
HUMAN RESOURCE DEVELOPMENT	RECRUITMENT - Ability of the laboratory to attract top students as a result of technical reputation and laboratory environment. - Success of the laboratory's recruitment plan relative to EEO. - Ability to attract qualified scientists and engineers from government and industry.
HUMAN RESOURCE DEVELOPMENT	INDIVIDUAL CAREER PLANNING - Effectiveness of the laboratory's training opportunities. - Role of personal and organizational development activities in the laboratory environment.

TABLE 1: GENERAL GOALS, CRITICAL SUCCESS FACTORS AND SUBJECTIVE MEASUREMENTS (CONTINUED)

processing capability at all levels of management and particularly at the project engineer level. As we can see from our analysis of information flows in Appendix B, much of the information we use on a day-to-day basis originates with or relates to the activities of the project engineer. However, very few management information systems in use today actually relieve the project engineer's work load. In fact, many systems increase work load due to data input, update, and quality control functions. We need to concentrate on reducing the number of input requirements levied on the project engineer. We also need to provide the project engineer with better support. A LONEX type system has the potential to offload project engineers' work through effective productivity enhancement tools and also could provide an easy interface to key management data and other service functions.

2. The Laboratory Operations Center is demonstrating the usefulness of a shared corporate data base in a laboratory operations environment. Data is input into a centralized data base through user friendly front-end terminals. One of the most significant capabilities demonstrated by the LOC is in the area of telecommunications and teleconferencing. The central data base coupled to a slow-scan video system included in the LOC approach offers a powerful and flexible management information reporting capability.

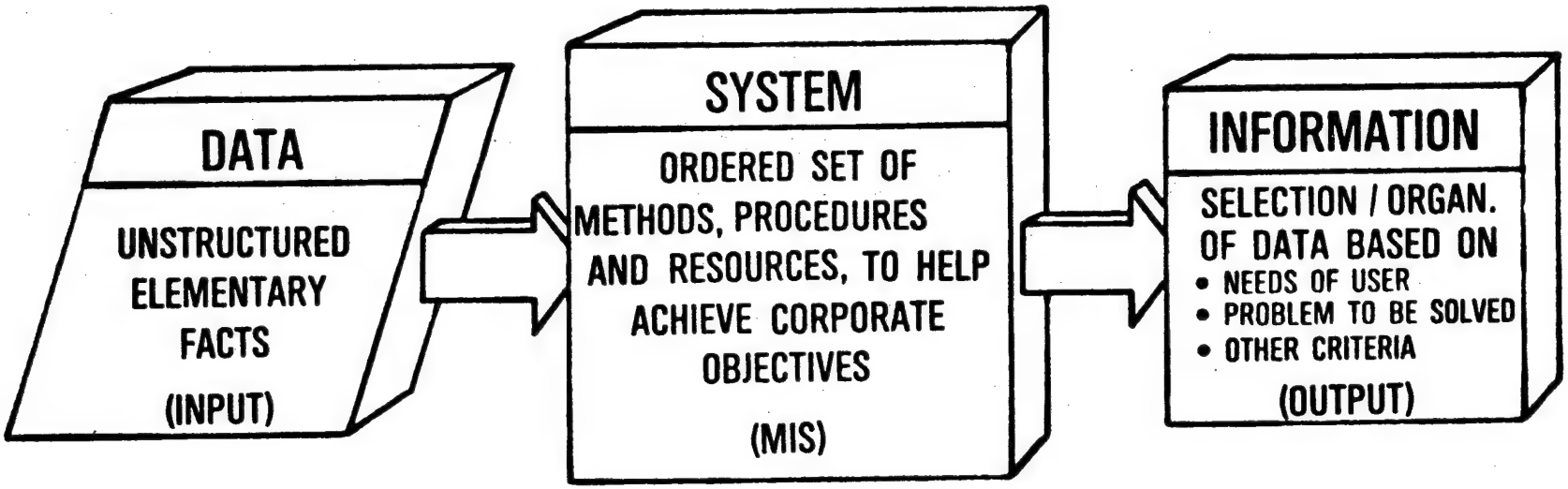
3. The Automated Information and Documentation System at AFOSR has progressed beyond the experimentation stage and is now used in day-to-day AFOSR operations. AIDS demonstrates the benefits of an integrated business system in the office environment. Using smart terminals linked to a central computer, AIDS captures information as an integral part of the work flow process. The word processing and printing capabilities in the system

allow many documents to flow through the organization in electronic form. This results in considerable work load savings.

The three information systems described have considerable merit. Each is emphasizing a relatively unique aspect of the total information system development process. Future systems to be implemented will undoubtedly integrate these approaches into a total systems concept that can adequately support laboratory and headquarters information needs.

Two areas that need to be discussed further are management information systems and productivity enhancement tools. Figure 16 provides a simplified overview of a management information system. This information requirements study has only dealt with the needs of the user in terms of general information requirements. The next step in the process involves a detailed analysis of the data in elementary form generally called data elements. Once this step is completed, we have defined the input requirements (data) and the output requirements (information). We can then go about the business of designing the management information system that converts the data into meaningful management information.

An example of a data element analysis was developed by AFATL to demonstrate how we can move from a definition of the output in terms of general information to a definition of the input in terms of data elements. AFATL began by evaluating the information flows data presented in Appendix B. The information product flows were viewed in terms of their constituent data. It was then determined that the information needs from individual projects appear to fall into four general categories--technical, contractual, personal/organizational, and financial. A data element list, shown in Table 2, was then developed. Assuming all information starts with the project engineer, the others in the hierarchy include in ascending



AN EFFECTIVE MIS STORES, ORGANIZES, AND RETRIEVES DATA TO PRODUCE MEANINGFUL INFORMATION

FIGURE 16: MANAGEMENT INFORMATION SYSTEMS

order--group leader, branch chief, division chief, laboratory staff, Laboratory Commander/Director, Director of Laboratories, Headquarters AFSC, USAF, DOD, and Congress. At each higher level, information is combined by task, project, program element, etc. The data elements described in Table 2 are not necessarily complete, but represent a good first start at identifying the information which the project engineer provides on a recurring basis. Given these data elements, it is possible to develop an automated system that will satisfy most of the operational information needs of the hierarchy previously described.

Before we leave the subject of management information systems, it is instructive to review an approach used by Battelle Columbus Laboratories to analyze the requirements for new information systems. The method, shown in Figure 17, consists of information systems analysis matrices to guide information system development. The upper left quadrant relates information processes to the laboratory organization structure. This describes which organizations have responsibility for or interface with key information processes. The lower left quadrant relates information processes to current and planned information system capability. The lower right quadrant relates information systems to data elements. And, finally, the upper right quadrant relates data elements to the organizations responsible for those elements. This approach serves as an excellent technique for the design and analysis of information systems once the information requirements have been identified.

The second area that deserves additional discussion is the area of productivity enhancement tools. Included in this category are office automation techniques, electronic mail, graphics support, word processing, etc. In the past, much of the productivity enhancement activity has been

INFORMATION BY CATEGORY

TECHNICAL

- Identifying Title
- Objective:
  - Near Term
  - Far Term
- Approach
- Requirement
- Schedule
- Payoff
- Deliverable End Item
- Complementary Efforts/ Related Programs
- Vanguard Planning Areas
  - Mission
  - Major Force Area
  - Functional
  - Target Capability Area
- Background/Progress
- Laboratory Thrust Area
- Distribution Limitations
- Contractor Access:
  - Yes
  - No
- System Relationship
- TPO Number
- COSATI Codes
- Benefit Coes
- End Product Codes
- Major Customer
- Environmental Impact
- TN #, Category
- ROC Number

CONTRACTUAL

- Contract Type
- Acquisition Type
- T&E Requirements
- Contract Number
- Forecast Initiation Date
- Actual Initiation Date
- Forecast Obligation Date
- Actual Obligation Date
- Contractor Name
- Contractor Address
- Security Classification:
  - Of Work
  - Of Write-Up
- PCO Name
- PCO Phone Number
- Contract Duration

PERSONAL/ORGANIZATIONAL

- Date of Input
- Principal Investigator
- Program Manager's Name
- Program Manager's Grade
- Program Manager's Phone Number
- Program Manager's Office Symbol
- Joint Service Participants
- Performing Activity
- Manpower Requirements
  - Total
  - Rate of Expenditure

FINANCIAL

- Program Element
- Project Number
- Task Number
- Work Unit Number
- Estimated Cost/Funding Profile
- Reimbursable Funds:
  - Amount
  - Source
- CAP Amount
- Overceiling Requirement
- Contract Amount

TABLE 2: REPRESENTATIVE DATA ELEMENT LIST

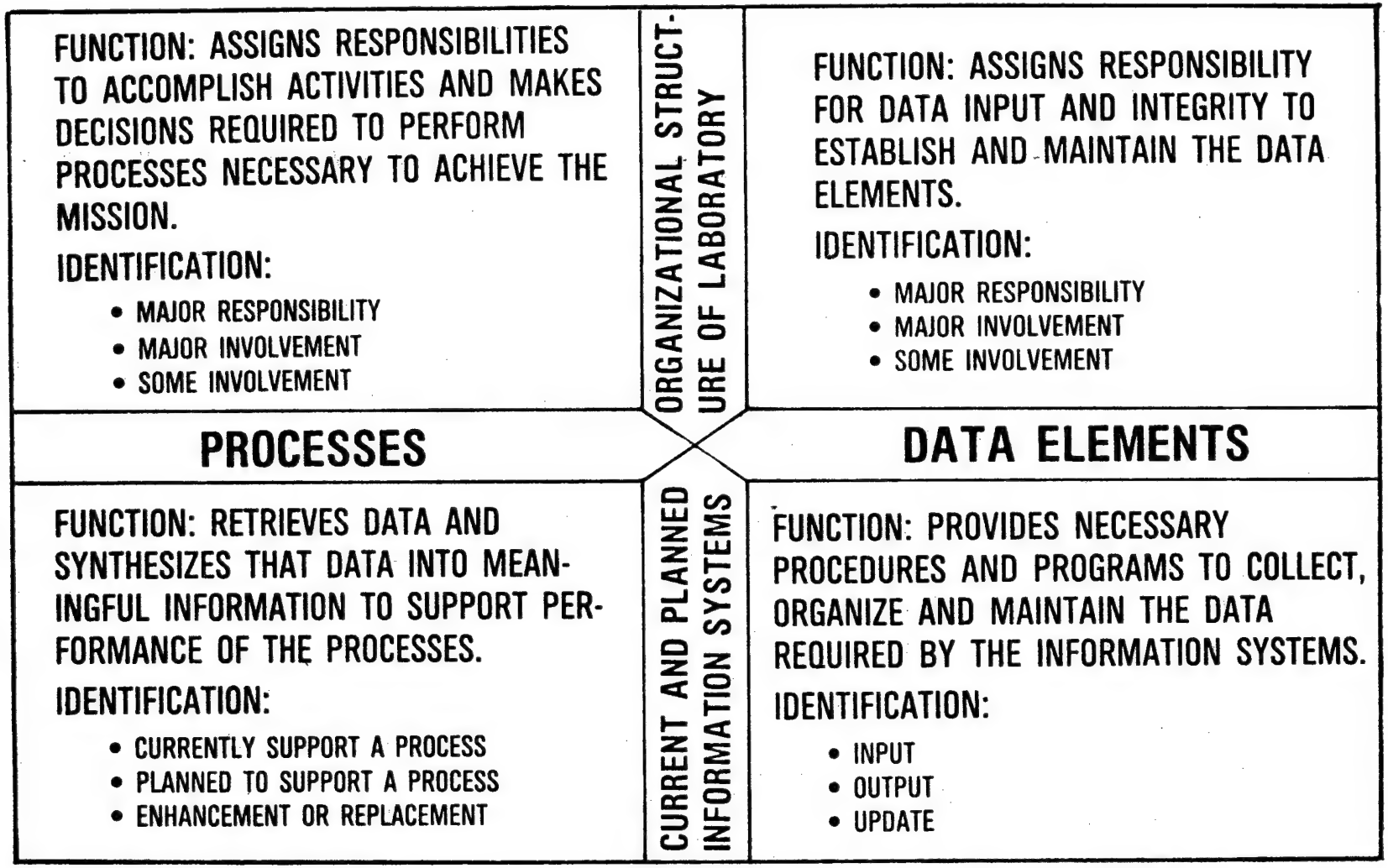


FIGURE 17: INFORMATION SYSTEMS ANALYSIS MATRICES

associated with the secretarial/clerical function in an organization. Recent studies have shown that greater productivity gains can be achieved by focusing these tools on the professional community. RADC has shown this to be the case based on results to date from the LONEX. In determining where productivity enhancement tools could be used most effectively, we need to evaluate organizational interfaces and information flow processes. For example, one of the most labor intensive jobs facing a laboratory contract monitor is the development of the statement-of-work and purchase request package. Productivity enhancement tools such as word processing and electronic mail could significantly improve this process. Electronic mail interfaces could be set up between the line organization and the procurement support organization to expedite the statement-of-work and purchase request coordination process. Two-way communications could easily be set up between the buyer and the laboratory contract monitor. It is not always easy to automate the interfaces between two different organizations, particularly if they report to different parent organizations. However, electronically linking to your primary support organizations should be a first priority initiative. The advantages are in terms of productivity enhancement. This represents just one example of the many applications of productivity enhancement tools in a typical laboratory organization.

E. SUMMARY OF PROBLEM AREAS AND NEEDS

Each level of an organization and each person within the levels have their particular problems and needs due to varying responsibility and personal traits. However, no information system, which attempts to balance between costs and benefits, can be expected to alleviate and satisfy problems and needs that exist because of the idiosyncrasies of the personnel who will be using it. Therefore, for any information system to

succeed in an organization, the identification of common problem areas and common needs is of critical importance.

1. The following are some of the common problem areas faced by the laboratories.

a. Redundant Inputs - Laboratory project engineers are required to input the same data to different automated and manual information systems. They consider these redundant activities to be time-consuming and unproductive. Moreover, some data, such as time spent on project, are required by different information systems in different formats such as manhour, manmonth, or manyear. This requires the project engineer to manually calculate the same data in different formats.

b. Redundant Data Bases - If there exist redundant inputs, then the data bases of the various information systems will likely also be redundant. The problem here is to determine which data bases contain the most up-to-date information when input and update activities occur at different points in time. Also, the likelihood for errors to occur is much greater when one is required to input or update the same data multiple times.

c. Reported Data are not Current - Certain data reported by the various information systems lack the timeliness and accuracy required to monitor costs, schedules, and performance. For example, JOCAS is reporting billed costs weeks after they are actually billed and, in fact, earned costs are needed. Certain data contained in the information systems or manual files do not always agree with each other.

d. Awkward Report Formats - Many reports produced by the current information systems are presented in awkward formats. Large amounts of information are crammed into one page of standard computer

printout. The headings of the reports are often so abbreviated that no one really understands them. The reports are not presented in concise formats so that one can find the information quickly.

e. Lack of Exception Reporting Capability - Project engineers are often required to hunt through many pages of a particular report in order to find data which varies from the norm. It is important to provide the ability to examine only those indicators where performance is significantly different from expected results.

f. Lack of Ad Hoc Reporting Capability - Users are often frustrated because of the lack of ability of information systems to supply information in a format with which they are most comfortable. The information systems also lack the capability to provide information at times when it is most needed.

g. Lack of Summary Information - The ability of the information systems to present data in both detailed and aggregated levels should be stressed. The detail levels of information should correspond to the increasing levels of decision making responsibilities of management. Higher level management should be provided with the choice of reviewing summary information or detailed information.

h. Lack of Sensitivity Analysis Capability - The ability to ask "what if" types of questions does not exist in the current information systems. As an example, users need to know what would happen to the overall costs and schedule of a work unit if a particular milestone is slipped one month, or what would be the overall cost of a project if funds are shifted from one work unit to another.

2. The following represent some management needs that must be satisfied by any new program/project management system.

a. Need to quickly modify the system to correspond to user need changes. The information needs of the user change when changes occur in the environment. The information system should be responsive to such changes in order to avoid the flexibility problems apparent in existing systems like JOCAS and MASIS.

b. Need for the system to have flexibility of growth. Initially a program/project management system will likely only handle the most needed information such as cost, schedule, and performance. In the future the system should easily be enhanced to incorporate information on such items as supplies and facilities.

c. Need to interact with CMIS. CMIS will be the official management information system of AFSC. All laboratory input, output, and update activities should be coordinated with CMIS. CMIS will be a valuable information system to supply needed information on an integrated basis to AFSC, AF Headquarters, DOD, and Congress. However, there will be a need for a local system to serve as the "front end" in supplying timely and accurate information to CMIS. Moreover, the local "front end" system will satisfy the unique information needs of internal laboratory personnel.

d. Need for automated financial status information at program element, project, task, and work unit levels. It is essential for the system to quickly and accurately aggregate detailed financial status information to higher levels. The detail levels at which the information is reported should depend on the requesting parties.

e. Need to input concise descriptive data along with cost and schedule data. This need stems from the fact that often the cost and schedule data alone do not provide a true picture on the progress and the final outcome of a project. Therefore, the descriptive data will enable

management to be better informed if variances in cost and schedule do occur.

f. Need to receive feedback on summary of all cost components. The system should capture and summarize all cost components such as manhours, travel, supplies, and facilities. This requires integration of these various application functions.

g. Need to present information precisely and concisely. It is best to develop report formats during the detailed user requirements analysis phase after the desirable system attributes and capabilities have been defined.

h. Need to automate the review process. The information required by the review process should be automated to the maximum extent possible. Some of the information can be constructed from an integrated data base of the system rather than requiring additional manual work.

i. Need for more graphical capability. Most current information systems lack any significant graphical capabilities. The reports which current information systems produce are mostly in tabular form which are far more difficult to digest than concise graphical presentations.

j. Need for fast and consistent response time when retrieving information. In order for the information to reach the various levels of management in a timely manner, the information system must operate in an environment that offers fast and consistent response time, minimum turnaround time, and minimum downtime. The current information systems often fail to provide timely information due to slow and inconsistent response/turnaround time, and unscheduled computer outages.

k. Need for better human-engineered system interfaces. Acceptance and commitment of users toward any new information system depend largely on how "friendly" the user-system interface is. Awkward report formats, excessive abbreviations, crammed formats, and difficult-to-learn query languages existing in current information systems have caused acceptance problems.

l. Need to preserve historical reference data in all major functional areas including training, travel, manpower, funding, technology transfer results, etc. This information is essential for the development and analysis of trend data.

V. CONCLUSIONS AND RECOMMENDATIONS

A. GENERAL CONCLUSIONS

During the course of this study, we collected and integrated a large amount of data to guide DL organizations in the overall area of information resource management. A number of methodologies to identify information needs were reviewed and evaluated. We focused on two key approaches--one that identifies needs from the bottom-up and the other from the top-down. The bottom-up approach yielded a large number of information products and needs which were then categorized in terms of major business functions. The results from this approach were heavily oriented toward operational day-to-day needs. It was obvious from our review of current management information systems, that most automated systems are directed toward the support of operational needs. Strategic and tactical information needs are basically handled by manual approaches in today's environment.

The top-down approach focused on six key goals for government research and development activities. Four critical success factors were identified for each key organizational goal. A comparison of results between the two approaches and an evaluation of current information processes result in a key conclusion for this study. Current automated information systems do not, in general, provide the type of information top management needs to track progress toward achieving key organizational goals. Current systems focus heavily on the resources and productivity goal and the control and accountability goal. Very little automated, well integrated information is available to support progress in the other four goal areas. New initiatives at Headquarters AFSC are beginning to address this problem. For example, current emphasis on corporate planning should significantly

help in achieving the purpose and direction goal. New pay for performance initiatives in the personnel area will contribute to human resource development.

In looking at the simplified laboratory R&D management cycle shown in Figure 3, we can draw some significant conclusions concerning management needs and the responsiveness of our current processes. Most of the specific needs identified in the bottom-up approach are oriented toward the program execution phase. This implies that we may be over-emphasizing this area and not providing sufficient management attention to the strategic and tactical needs associated with the strategy development, major thrust planning, and program formulation phases. These areas are being addressed in today's environment, but the approach is generally manual. The manual approach is highly labor intensive and lacks the real-time flexibility that is needed for an effective decision support system. Productivity enhancement tools coupled with improved MIS capability should resolve this deficiency.

In evaluating the information interfaces between the laboratories and other organizations, it is obvious that a well-coordinated inter-command IRM initiative is essential. Initial attention should be focused on the operational interfaces between a laboratory and its local support organizations. This area has the highest potential for improvements in mission performance, laboratory operations, and productivity. Much of the frustration in the laboratories' scientific and engineering communities results from dissatisfaction with local support processes. Productivity enhancement tools jointly implemented by laboratories and support organizations could improve this situation significantly.

The representative laboratory organization shown in Figure 5 generally identifies the major organizational elements in a typical laboratory organization. A review of information needs and critical success factors for these organizational elements identifies a critical deficiency. In the area of management information support, most of our effort is focused on financial management in a form that supports day-to-day financial management operations. Very few of the operational MISs actually help the project engineer. Existing systems do not provide sufficient local flexibility to offload or reduce work load in the project engineering function. Blending modern information managment technology with productivity enhancement tools should be able to resolve this deficiency. Information and office automation support is also needed. Effective and flexible real-time business graphics capability at the local level is also essential. Information and office automation support is also needed in the other areas of a laboratory including management services functions, technical support functions and other staff offices. Realistic decision support systems need to be developed for management tailored to the proper level of responsibility and the mission. These systems should include the capability to store historical data in key business functions in order to facilitate trend analysis. Finally, information system support is essential in the strategic and tactical planning areas. In order to provide this support effectively, we must develop an adequate way to handle classified data in a real-time environment.

A review of information flows between the laboratories and Headquarters AFSC shows that significant gains can be made by improving the information flow process among headquarters staff offices at the headquarters level. A considerable amount of redundant information is

requested from the laboratories. Many times this information is already available at headquarters level in some other staff office. The CMIS initiative at headquarters should improve this problem. However, the laboratories have a responsibility to ensure that accurate laboratory data resides in headquarters data bases.

In summary we have found that common information requirements primarily stem from headquarters information needs. These requirements lend themselves to some form of standardization. We have identified a general set of key laboratory goals and associated critical success factors that can be used as the basis for developing an executive level decision support system for laboratory management. Unique information requirements are generated by differences in mission, organizational structure, external interfaces, local base environment, etc. Standardized systems cannot effectively handle these requirements. The Laboratory IRM Management Working Group has concluded that a "meet at the interface concept" emphasizing standardized information/communications interfaces between headquarters and field organizations offers the best hope for effective and realistic information resource management.

B. RECOMMENDATIONS

As a result of this study, two sets of recommendations were developed. The first set addresses those issues oriented toward HQ AFSC/AC.

- (AC1) Initiate Headquarters/Field interface standardization efforts to accomplish the following:

a. Identify required data elements at the Headquarters level including those covered in standard management information systems and develop uniform definitions for those data elements.

b. Implement standard data transfer protocols for electronically transmitted data.

c. Implement uniform and effective long haul communications procedures.

- (AC2) Develop and implement techniques to improve automated data transfer between standard and local management information systems to avoid redundant data entry efforts.
- (AC3) Initiate a joint IRM/IRMCO study of RCS and non-RCS reports with the goal of eliminating or reducing those reports that are of questionable value or no longer needed. Current regulatory reviews under IRMCO do not receive sufficient management attention to be effective.
- (AC4) Allow field organizations flexibility to develop information systems to satisfy their unique requirements with capability to "meet at the interface" for headquarters required data.
- (AC5) Implement a continuous IRM coordination process among product divisions, test centers, and laboratories to exchange views and evaluate "lessons learned."

The following set of recommendations addresses those issues pertinent to HQ AFSC/DL.

- (DL1) Develop an Integrated Laboratory IRM Program Management Plan compatible with HQ AFSC IRM Policy and Initiatives that can be used to augment and enhance the overall AFSC IRM Program Management Plan developed by the IRM Program Management Office at Electronic Systems Division.
- (DL2) Establish an intercommand productivity enhancement initiative to improve the information interface between laboratories and their local supporting organizations.

- (DL3) Develop an effective coordination channel with AFLC's Logistics Information Management Support System (LIMSS) Project to provide AFLC with the benefit of Laboratory IRM experience and to ensure that Laboratory/AFLC information interfaces are adequately addressed.
- (DL4) Initiate a study of existing standardized management information systems used by the Laboratories, e.g., MASIS, JOCAS, etc., and recommend near-term improvements that are realistic to implement.
- (DL5) Improve the flow of information among headquarters staff offices to avoid unnecessary tasking of field organizations for information already available at headquarters.

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APPENDIX A

METHODOLOGIES TO ASSESS INFORMATION REQUIREMENTS

A. METHODOLOGIES

During the early stages of this project, many existing studies were reviewed. The bibliography gives some indication of the depth of that review. Many different approaches have been used in the past to assess information requirements. The following approaches are highlighted in this section:

a. Management Needs List

b. Information Flows Analysis

c. Information Product Approach

d. Critical Success Factor Method

e. Business Function Analysis

All of these approaches were used to some extent in the development of this overall requirements document. For consistency with the product division and test center efforts, the business function analysis provided a unifying framework for the results gathered from all the other approaches.

1. MANAGEMENT NEEDS LIST

The management needs list approach was used by the Federal Computer Performance Evaluation and Simulation Center (FEDSIM) in developing a requirements document for AFSC's Space Division. Structured interviews were conducted with Space Division Data Processing user organizations. FEDSIM personnel and Space Division data automation personnel jointly conducted the interviews. The users were asked to provide certain information about their organizations and to describe their functional requirements. FEDSIM then analyzed the information provided by these users and conducted additional interviews with certain users to obtain additional details about the requirements. To ensure consistency in the initial

interviews, FEDSIM developed the interview guidelines shown in Figures A-1 and A-2. Figure A-1 contains the guidelines for obtaining general information about the users' organizations and Figure A-2 contains the guidelines for obtaining information about specific functional requirements. FEDSIM analyzed the requirements identified by the users and consolidated the list of requirements by grouping user requirements together whenever possible and separating the actual functional requirements from the capabilities needed to satisfy the requirements. All functional requirements were then categorized into broad functional areas within a hierarchical framework. Three hierarchical levels were chosen including the product division level, the program level, and the project level. Within each of these levels, specific functional requirements were grouped into the general functional areas shown in Figure A-3. FEDSIM identified 69 different requirements as a result of their interviews. They summarized these requirements by listing all functional requirements by general functional area and hierarchical level.

2. INFORMATION FLOWS ANALYSIS

The information flows analysis approach was used by Systems Architects, Inc. (SAI) in a study for the Aeronautical Systems Division's Deputy for Systems. Since specific exhibits showing this methodology are proprietary to SAI, no samples of the methodology can be reproduced in this document. In simple terms, the methodology consists of a structured data collection process using top down interviews. Specific data collection forms were used to identify applications of management information, identify user requirements, develop specifications for the general requirement, and develop detailed specifications for the input and output requirements. Then SAI identified and analyzed current formal and informal

OFFICE SYMBOL_____

I. GENERAL INFORMATION

1. Date _____ and starting time _____ of interview.
2. Name of interviewer _____
3. Name of area being interviewed _____
4. a. Name of person being interviewed _____
   b. Telephone number _____
   c. Address _____
   _____
   d. Position _____
   e. Type of work performed _____
5. What is the mission of this area? (Brief statement.)
   _____
   _____
   _____
6. How many people in this area? _____
   % or number
   a. Clerical _____
   b. Technical _____
   c. Managerial _____
   d. Other _____
7. Who else do you feel should be interviewed for additional general information about this area's functional requirements?

Name	Telephone No	Position	Why

8. a. About how many individual functional requirements will we be discussing at this meeting?_____
   b. For each functional requirement complete a FUNCTIONAL REQUIREMENT OVERVIEW questionnaire.
9. Ending time of interview _____
   Elapsed time: _____ hours _____ minutes

FIGURE A-1: ORGANIZATIONAL INFORMATION QUESTIONNAIRE

OFFICE SYMBOL_____

II. FUNCTIONAL REQUIREMENT OVERVIEW

1. Name and brief description of the requirment. _____

_____

_____

2. What is its objective or purpose? _____

_____

3. How does it relate to your mission? _____

_____

4. Is this requirement satisfied now in your area? _____

If so, how? (Briefly) _____

_____

Why should it be automated (if not already so) _____

_____

5. How important is it to you that this requirement be satisfied?

Extremely Important	Moderately Important	Not Too Important
10	5	1

_____

6. Do you feel that this requirement must be satisfied in the first year that the system is installed, or in later years?

_____

7. In what category would you place this function?

Fiscal (Accounting)_____ Research & Development_____

Administrative _____ Other _____

Office/Service _____

8. About how quickly would you required information after it's requested?

in a few minutes_____ in a day_____

in a few hours _____ other _____

9. About how often would information be requested?

many times a day_____ weekly_____

daily _____ other _____

FIGURE A-2: FUNCTIONAL REQUIREMENTS QUESTIONNAIRE

10. About how many people in your area would use this information? _____
And what classification of personnel are they? _____

_____

11. Who (or what) would be the original source of input information for this application? _____

_____

12. What form would the final usable result (output) of this application take? _____

13. Do you think the software for this application exists anywhere else?
_____ Where? _____

Is it a proprietary package? _____

or in-house programmed? _____

How can it be obtained? _____

Would modifications be necessary? _____

Minor _____, moderate _____, or major _____?

14. Do you think other users within the division would also use this application? _____

Who? _____

Would they (or you) require a modified version? _____

15. Would this application have to interface with other applications, data bases, files, etc., or would it be totally independent? _____

_____

_____

16. Who else should we talk to for more details about this application (either in your area or elsewhere)?

Name	Telephone No	Area

_____

_____

FIGURE A-2: FUNCTIONAL REQUIREMENTS QUESTIONNAIRE (CONTINUED)

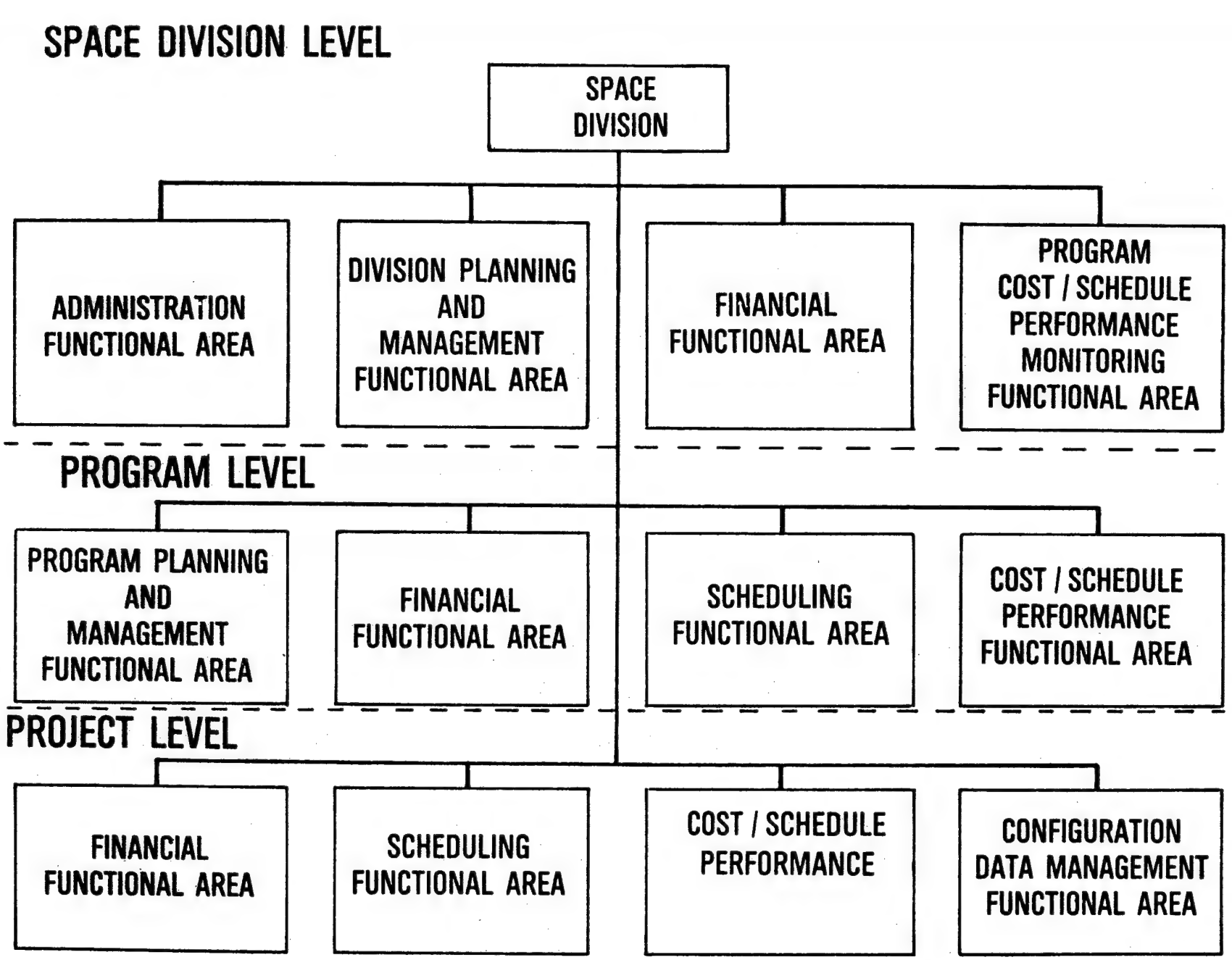

FIGURE A-3: HIERARCHICAL LEVELS AND FUNCTIONAL AREAS

information flows based on the data obtained during the data collection process. SAI developed a master flowchart depicting the organization's major activities. Information flows were then analyzed through a series of flowcharts demonstrating the relationship of individual information flows to the organization's major activities. SAI then developed a series of matrices relating organizational activities, areas for improvement, and information requirements. Conclusions and recommendations were drawn from this information.

3. INFORMATION PRODUCT APPROACH

The information product approach was developed by Booz-Allen and Hamilton, Inc. This approach has been used extensively in a number of government and industry studies. Since the company developed a nonproprietary marketing booklet that describes the methodology in detail, an overview of the methodology can be presented in this section. The basic approach involves establishing a baseline of current operations, developing and evaluating automated applications to improve operations, and conducting a post study analysis including a comprehensive assessment of cost benefit. Figure A-4 describes the product approach in general. Figure A-5 describes how the product flow and characteristic work in an organization is measured. The initial baselining study is conducted in five steps--data collection, findings, analysis, conclusions, and recommendations. After this initial study is completed, the information gathered allows you to draw significant conclusions concerning those products that should be automated, automation priorities, cost/benefit, etc. Figure A-6 describes the baselining tasks in more detail and is self-explanatory. Finally, Figure A-7 describes the conceptual approach that Booz-Allen and Hamilton uses to develop a cost model for the product approach.

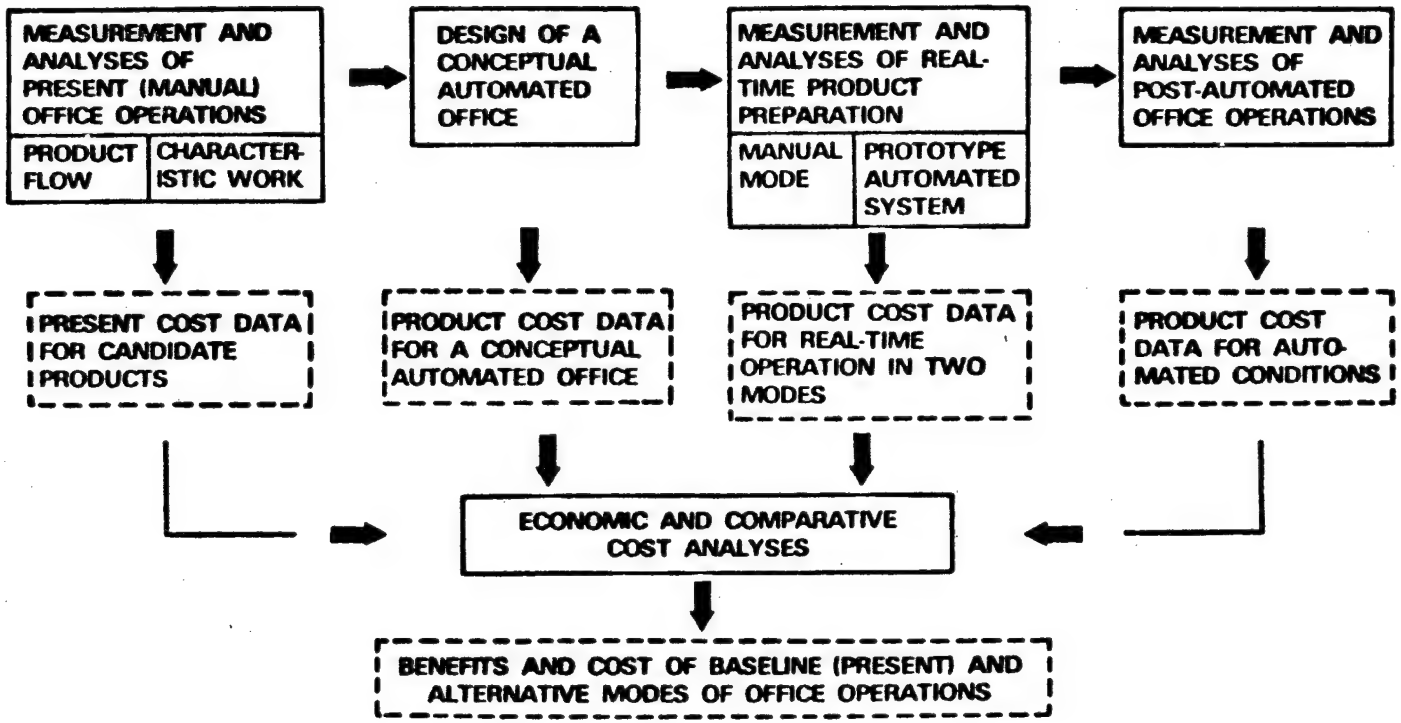

FIGURE A-4: PRODUCT APPROACH

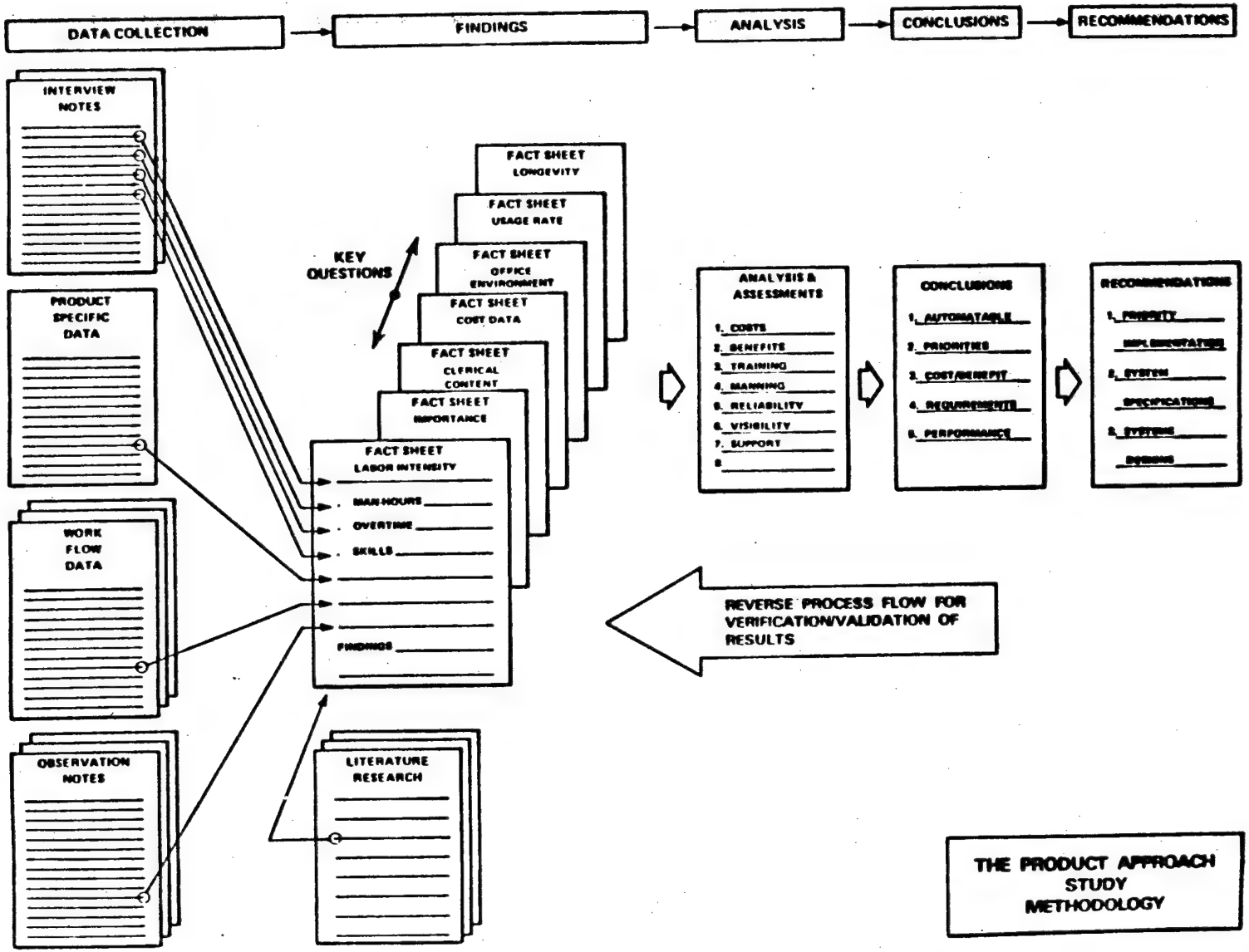

FIGURE A-5: THE PRODUCT APPROACH STUDY METHODOLOGY

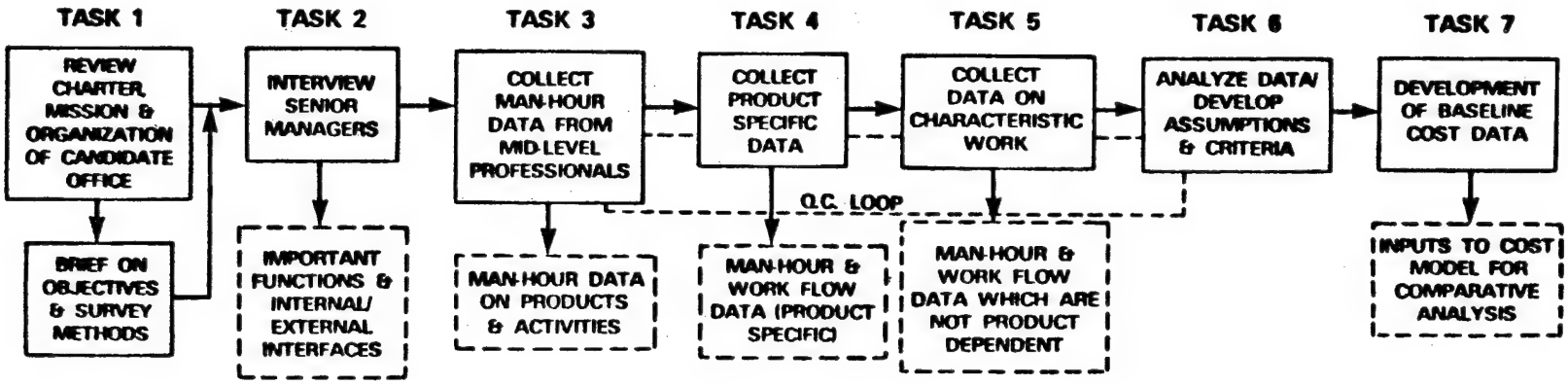

FIGURE A-6: TASKING FOR BASELINE MEASUREMENT

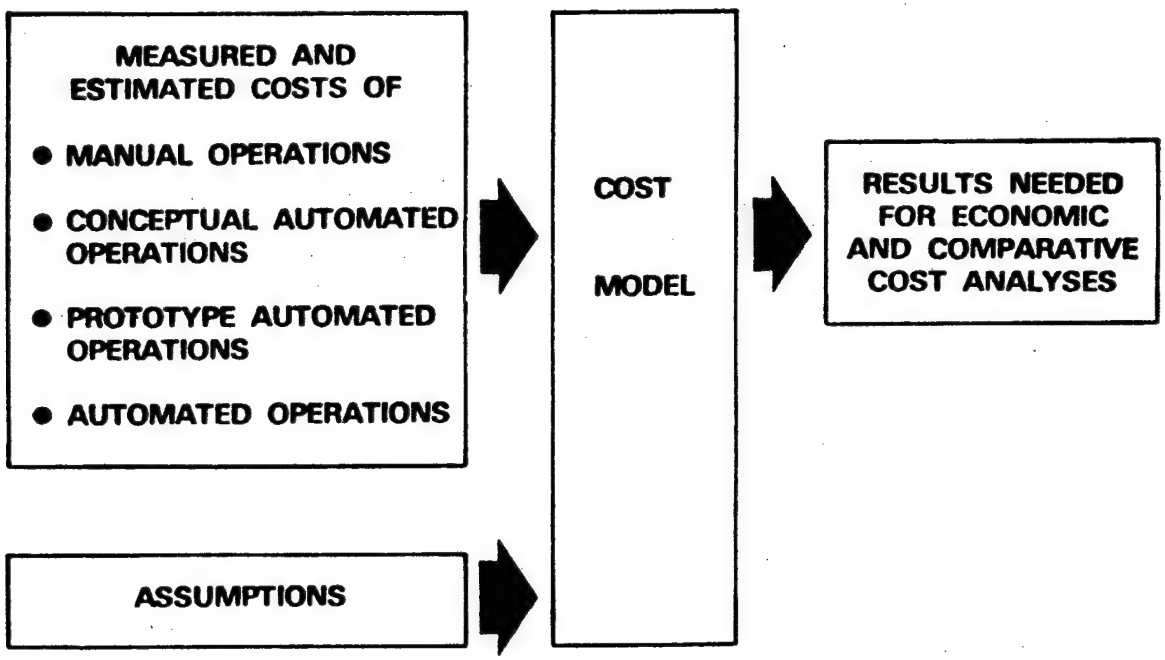

FIGURE A-7: A COST MODEL FOR THE PRODUCT APPROACH

4. CRITICAL SUCCESS FACTOR (CSF) METHOD

The CSF method was developed by the Center for Information Systems Research, Sloan School of Management, Massachusetts Institute of Technology. This approach was used by Battelle Columbus Laboratories in a study of information requirements for the Flight Dynamics Laboratory at Wright-Patterson AFB. Critical success factors are simply a limited number of areas in which results, if they are satisfactory, will ensure successful performance for the organization. They are the few key areas where things must go right for the business to flourish. CSFs are determined through interviews with top executives, middle managers, first line supervisors, and other key personnel.

The actual CSF interviews are usually conducted in two or three separate sessions. In the first, the interviewee's goals are initially recorded and the CSFs that underlie the goals are discussed. The interrelationships of the CSFs and the goals are reviewed to further clarify issues and identify which CSFs should be combined, eliminated, or restated. An initial cut at measuring CSFs is also taken in this first interview. The second session is used to review the results of the first, after the interviewer has had a chance to think about them and suggest ways to fine tune the factors. In addition, measures and possible reports are discussed in depth. Sometimes a third session is necessary to obtain final agreement on the CSF measures and reporting sequence.

The CSF method focuses on individual managers and on each manager's current information needs. It provides for identifying managerial information needs in a clear and meaningful way. Moreover, it takes into consideration the fact that information needs will vary from manager to manager and that these needs will change with time for a particular

manager. Since the CSF methodology was used extensively in this study, a separate section, Appendix D, has been included to show how the CSF approach can be applied in a laboratory environment.

5. BUSINESS FUNCTION ANALYSIS

The business function analysis approach was employed by ITT-Federal Electric Corporation under contract to the Space and Missile Test Organization (SAMTO). The overall methodology used in the SAMTO study includes a seven-step process as shown in Figure A-8. This process begins with a definition of business functions and ends with the development of a pro forma data structure. This process goes well beyond the scope of the initial AFSC Management Information Requirements Project. Therefore, the lead organizations agreed to concentrate on the first four tasks in the methodology. These initial four tasks were selected to provide a common basis to compare product division, test center, and laboratory information requirements. Figure A-9 emphasizes the approach used to identify information deficiencies and requirements. The final conclusions are drawn from an assessment of information modules that relate business functions and data classes.

With the current emphasis on Information Resource Management, numerous studies are being conducted throughout government and industry to identify information needs. The methodologies described in this section are only a few of the many approaches available. One key point to note is that these approaches primarily deal with general information needs whether manual or automated. The focus of this entire study involves the question of what information is needed by an organization, not what information should be automated.

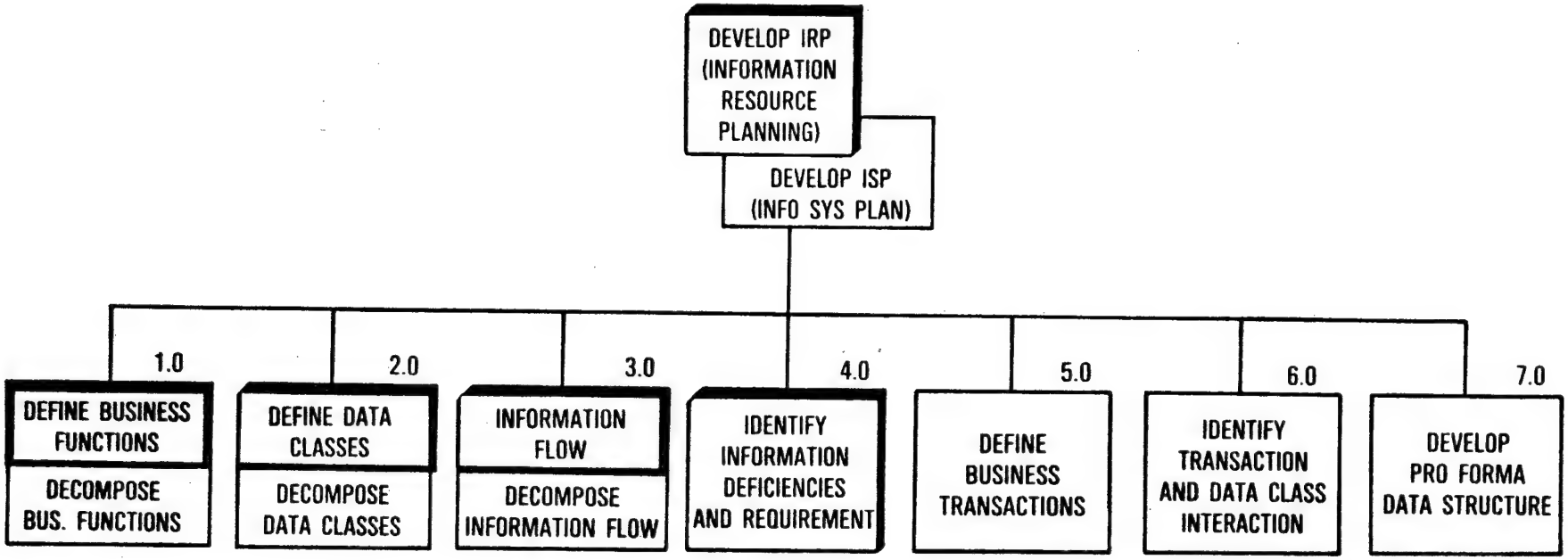

FIGURE A-8: SEVEN-STEP INFORMATION SYSTEMS PLAN

COMMON BUSINESS FUNCTIONS

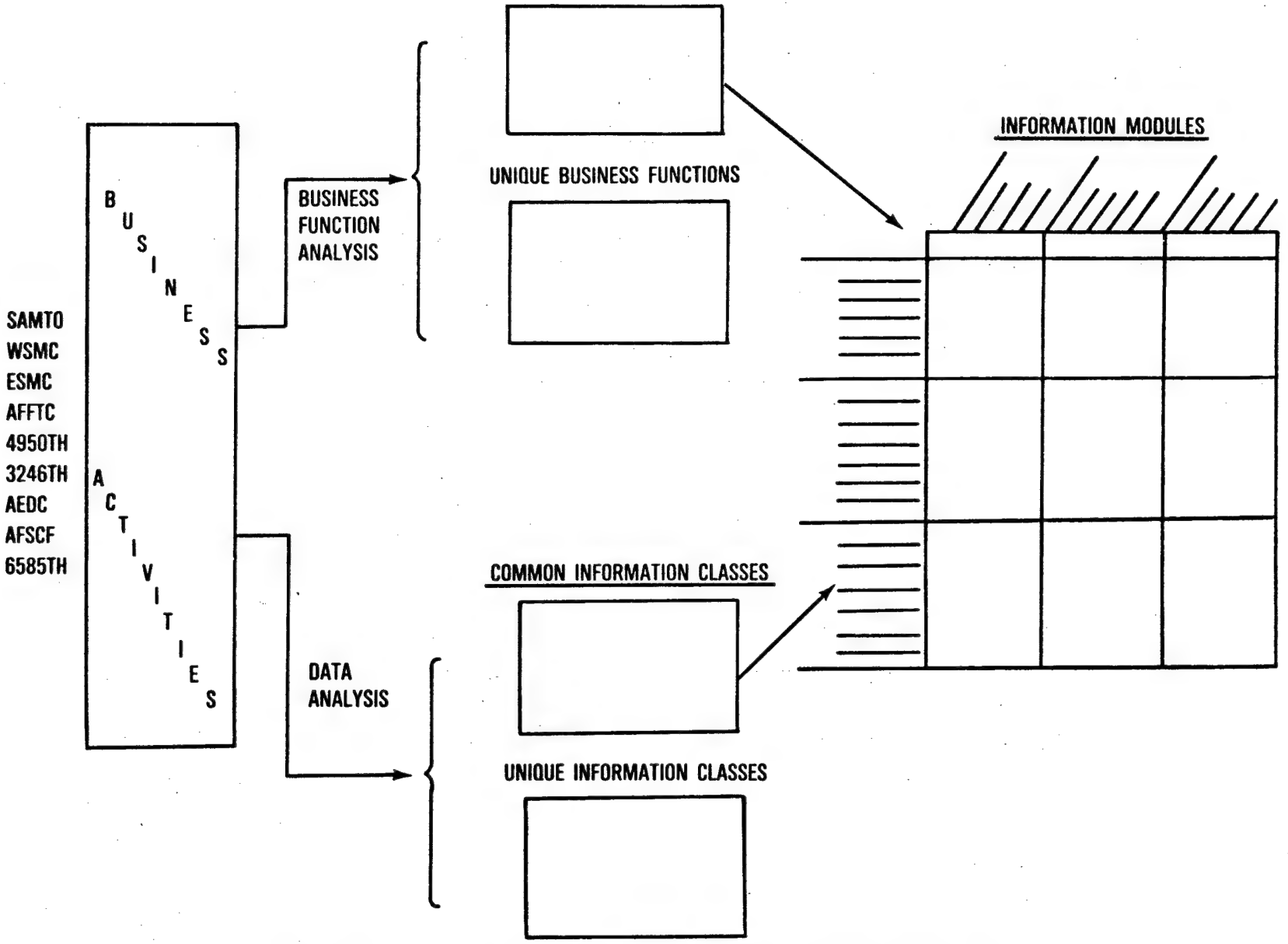

FIGURE A-9: BUSINESS FUNCTION METHODOLOGY

APPENDIX B

LABORATORY MANAGEMENT INFORMATION FLOWS

B. LABORATORY MANAGEMENT INFORMATION FLOWS

This section deals with the problem of identifying and analyzing key information flows that occur in a typical laboratory environment. Figure B-1 describes the scope of the identification and analysis process. Much of this work was done prior to the decision to adopt the business function methodology. Since this analysis had already been completed, no attempt was made to reformat the information in business function categories. Any detailed analysis of information flows is highly dependent on organizational structure. Such an effort was well beyond the scope of this project. Therefore, a representative flow process was utilized to eliminate the need to determine internal organizational flows. A simplified overview of the flow process is shown in Figure B-2. One of the key issues that this representation points out is that the project engineer is generally at the center of the information flow process on all activities relating to project management and many of the activities involving staff and support services interfaces.

In order to enhance our understanding of the information flows, we developed generalized flow diagrams describing the flows of major information products. The flow diagrams are presented in Figures B-3 to B-9 and describe information interfaces for seven functional areas--project management, planning, programming, financial management, manpower/personnel, facilities/logistics, and ADP management. The information presented in these charts basically cuts across all of the major business functions. The interfaces shown are limited to the major information exchanges (internal and external) needed to produce required information products. These interfaces will vary among the laboratories

MANAGEMENT INFORMATION

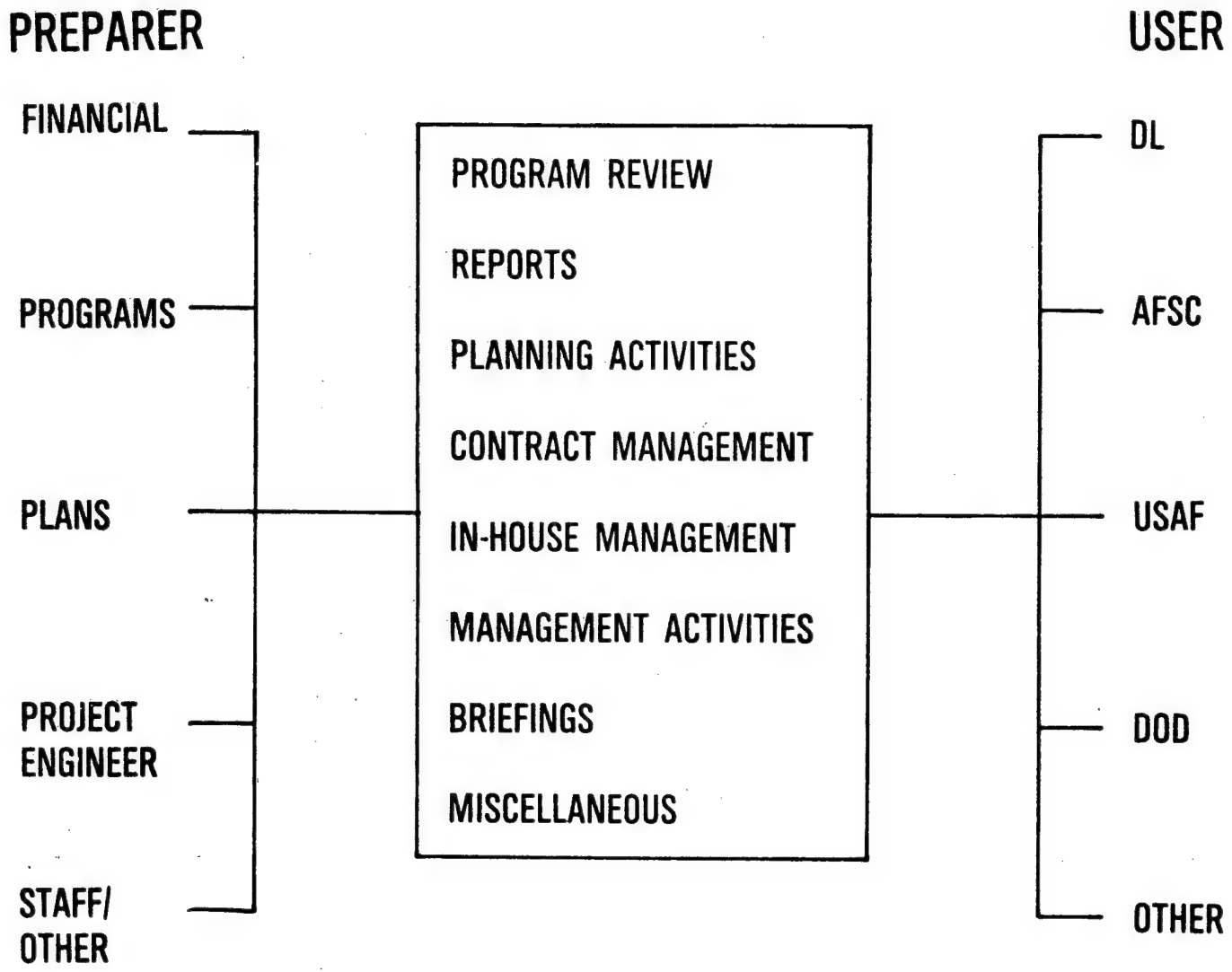

FIGURE B-1: SCOPE OF THE INFORMATION FLOWS ANALYSIS PROCESS

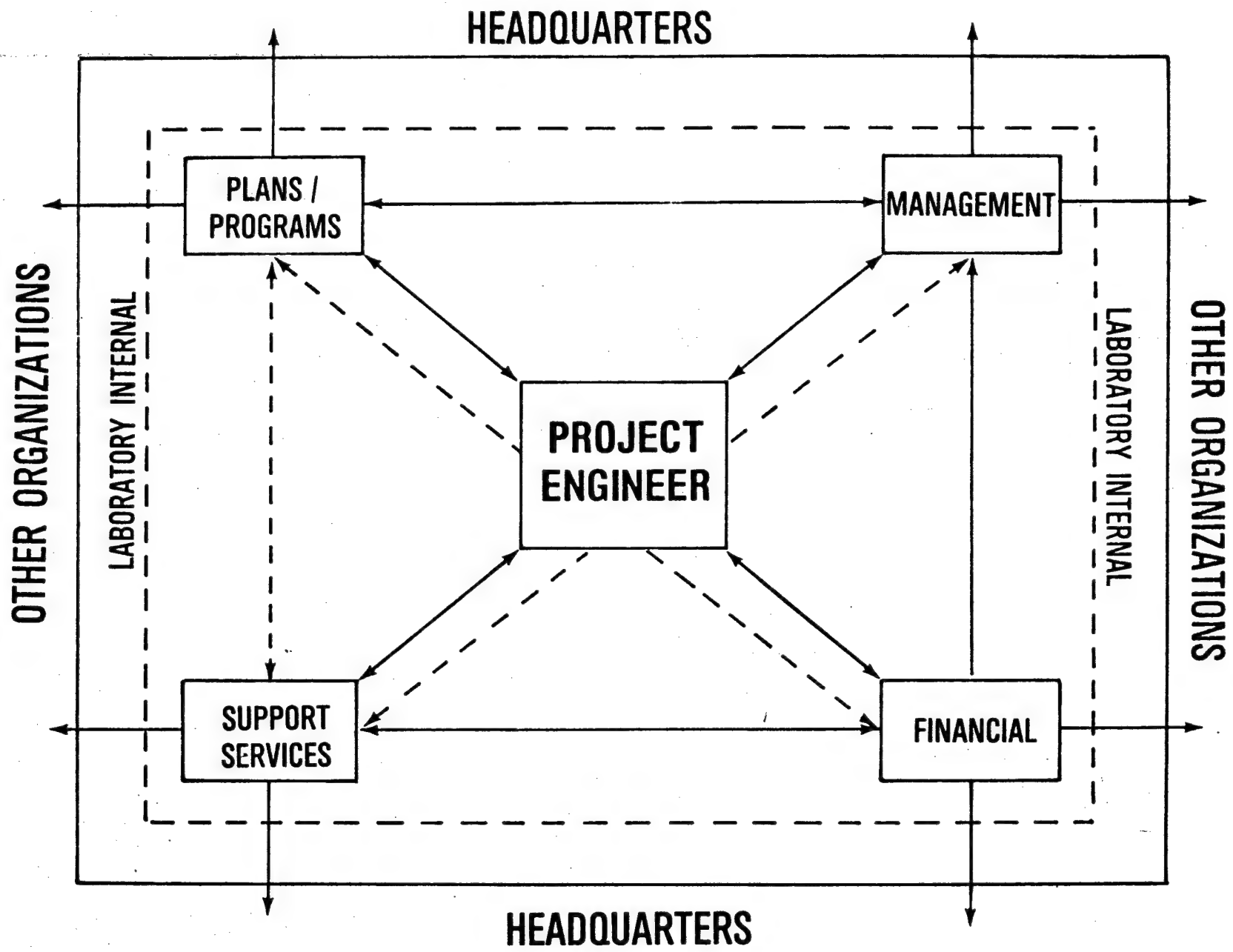

FIGURE B-2: SIMPLIFIED OVERVIEW OF MANAGEMENT INFORMATION FLOWS

due to the organizational differences and host-tenant agreements at the installations.

The flows presented are in no way inclusive, but are intended to provide a basis for further evaluation of information processes. For example, all of the interfaces between a laboratory and base supply are buried in Figure B-8 as base services. The interfaces in this case were so complex that they need to be treated in a separate project. Hopefully, the LIMSS project will address this interface issue in more detail. Only a representative portion of the products generated by the functional areas are shown. The flows analysis was limited to those products which require information manipulations or reformatting for presentation. In most instances, the information process is a duplicative effort since the data provided by one source is, in many instances, only rearranged for required reporting by the recipient. However, not all products shown on the flows involve a redundant information process.

In examining the flows and the processes, it is apparent that deficiencies exist and only a comprehensive AFSC information resource program will improve the information flow process. Therefore, these flow models should be viewed as general background for future work. The intent is to provide a basis for high level management analysis of information requirements and product needs and deficiencies. They should be viewed by the laboratories as a starting place for an in-depth information flow analysis project focusing on methods to streamline and improve current flow processes.

1. PROJECT MANAGEMENT

The project management process is key to the RDT&E function. Much of the information needed at all levels in the organization begins with the

project engineer. The project engineer inputs to the long range planning process, describes the current status of programs, provides an early input to financial management tracking systems, keeps MASIS current, interfaces with procurement, identifies needs to facilities and services organizations, interfaces with industry and government on technical matters, etc. Figure B-3 describes these interfaces in general terms.

One issue that became obvious early in the analysis of this function is that very few existing management information systems are actually structured to help the project engineer. In most cases, the project engineer receives no direct benefit from current management information systems. This situation must be corrected in order to develop an effective MIS that is supported at all levels of the organization. A second issue involves the duplicate reporting associated with the project management function. As previously mentioned, a great deal of information is required in a variety of formats and yet the source data is generally the same. Considerable efficiencies can be gained by coordinating requirements for information and eliminating unnecessary duplication. A final issue involves the need for productivity enhancement tools in this area. As discussed earlier in this report, LONEX has demonstrated the benefits of providing project engineers and their support personnel with productivity enhancement tools. The application of these tools to the project management process should be a high priority effort for all the laboratories.

2. PLANNING

The information flows associated with the planning function are shown in Figure B-4. The major products generated by this function require a constant interface with the financial personnel and the project engineer.

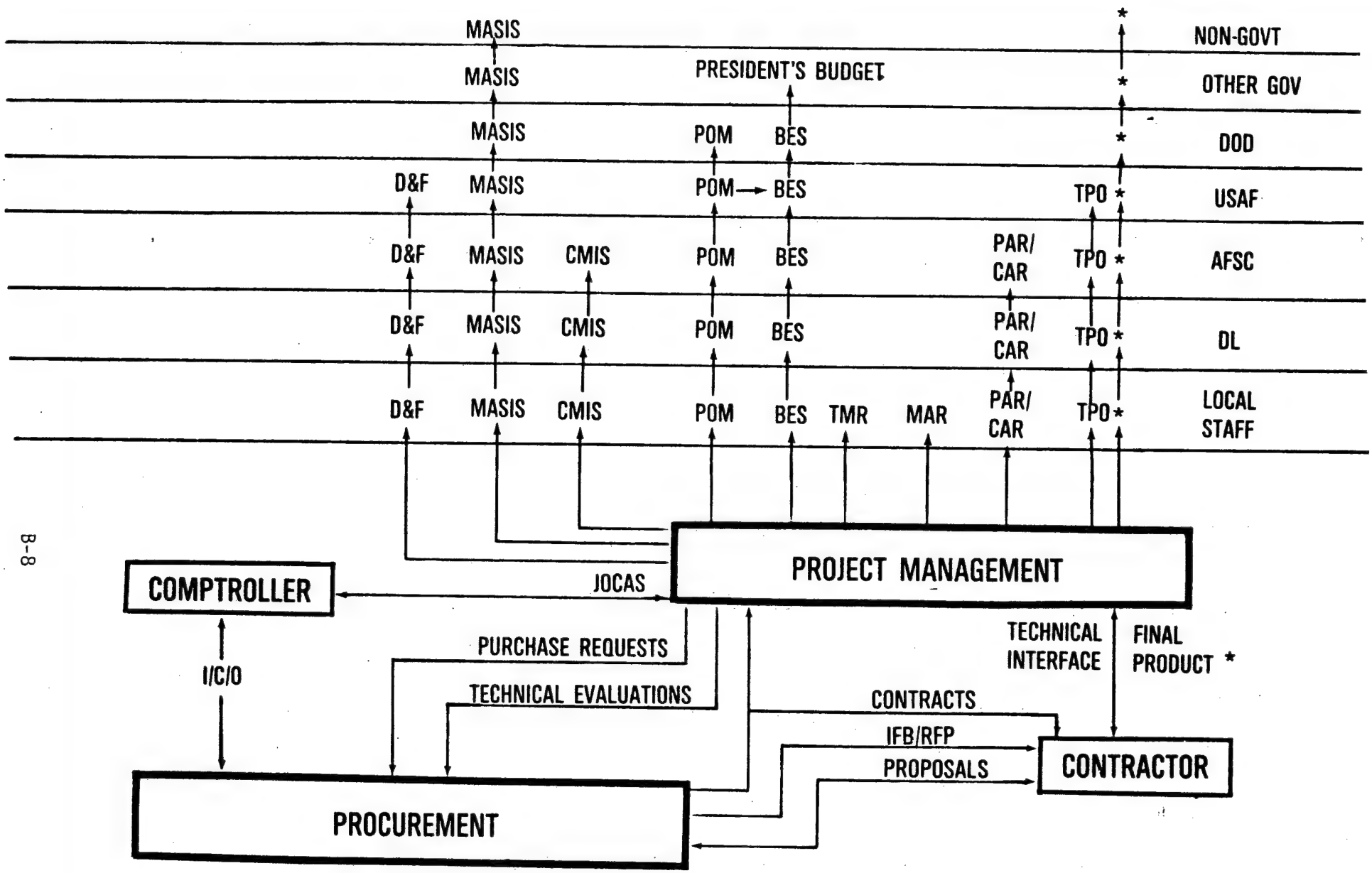

FIGURE B-3: GENERALIZED INFORMATION FLOWS FOR PROJECT MANAGEMENT

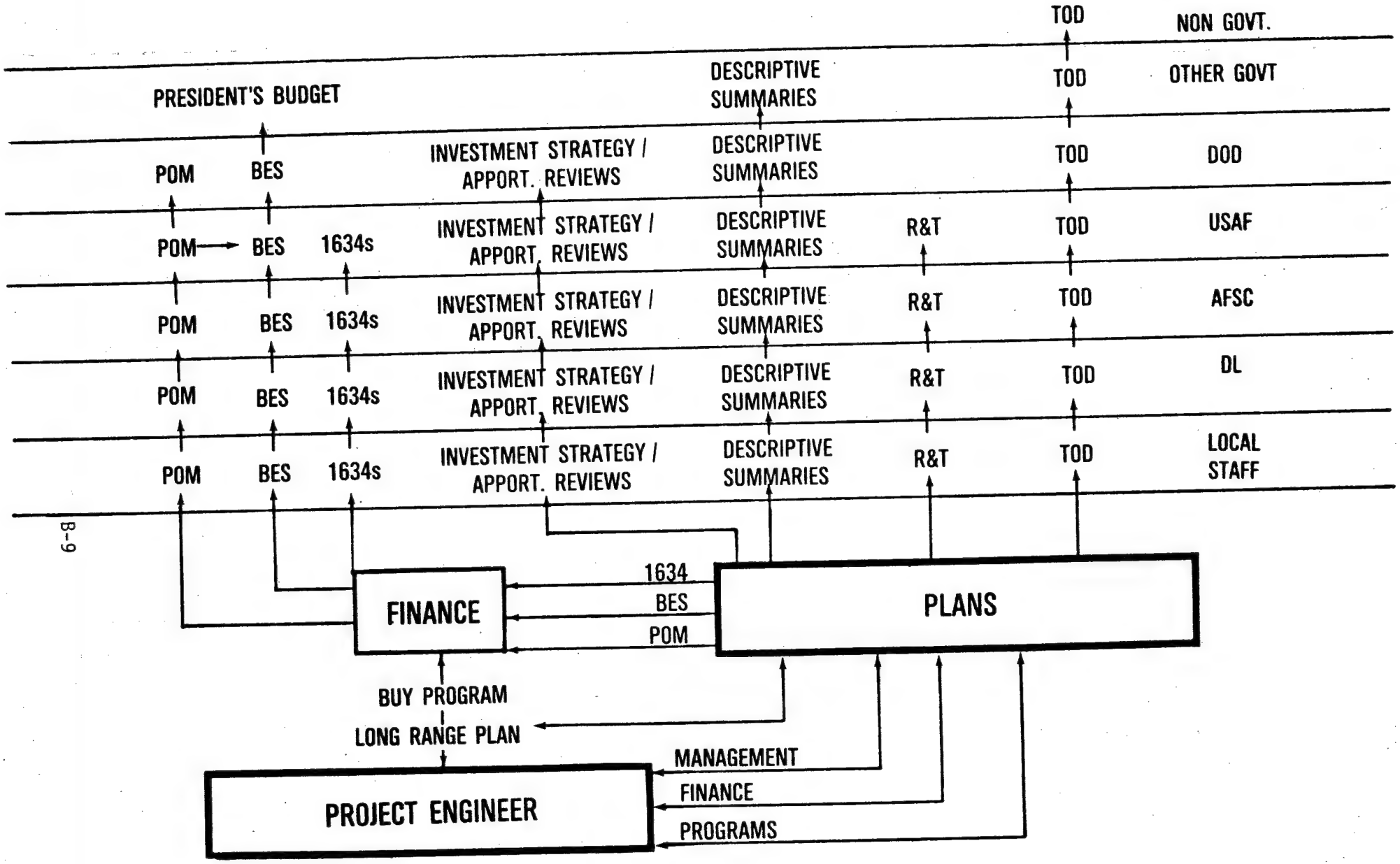

FIGURE B-4: GENERALIZED INFORMATION FLOWS FOR PLANNING

Their major product, the Research and Technology Five Year Plan, is developed during several months of internal interchange, reformulated for presentation to DL and published as an approximately 500 page document. The basic narrative of the R&T plan is lifted, reformatted, and produced as a Technical Objective Document (TOD) to be released to nongovernment agencies with an information copy forwarded to all government agencies receiving the R&T plan. Descriptive Summaries are rewrites of previous descriptive summaries which are verified by the project engineer before publication. All products shown in the flow diagram require written inputs from the project engineer/program manager. These inputs are reformatted to meet the planning function requirements.

3. PROGRAMMING

Principal programming functions are depicted in Figure B-5. Program offices perform a variety of staff activities such as program management, program reviews, technical assessments and public information dissemination. The key to a successful but varied programming function is the project engineer who provides the majority of the information utilized by the activity. The majority of the products shown in Figure B-5 are reformats or consolidations of information already available at higher headquarters in planning, financial, and/or assessment products. In addition to local activities, the programs offices respond to a number of special requests from higher headquarters. These requests are most often made via phone and require additional/special reviews on programs or projects. Typical requestors seek additional comments on submitted reports, briefings, or products. Generally, the requestor is not the recipient of the original source documents containing the necessary information.

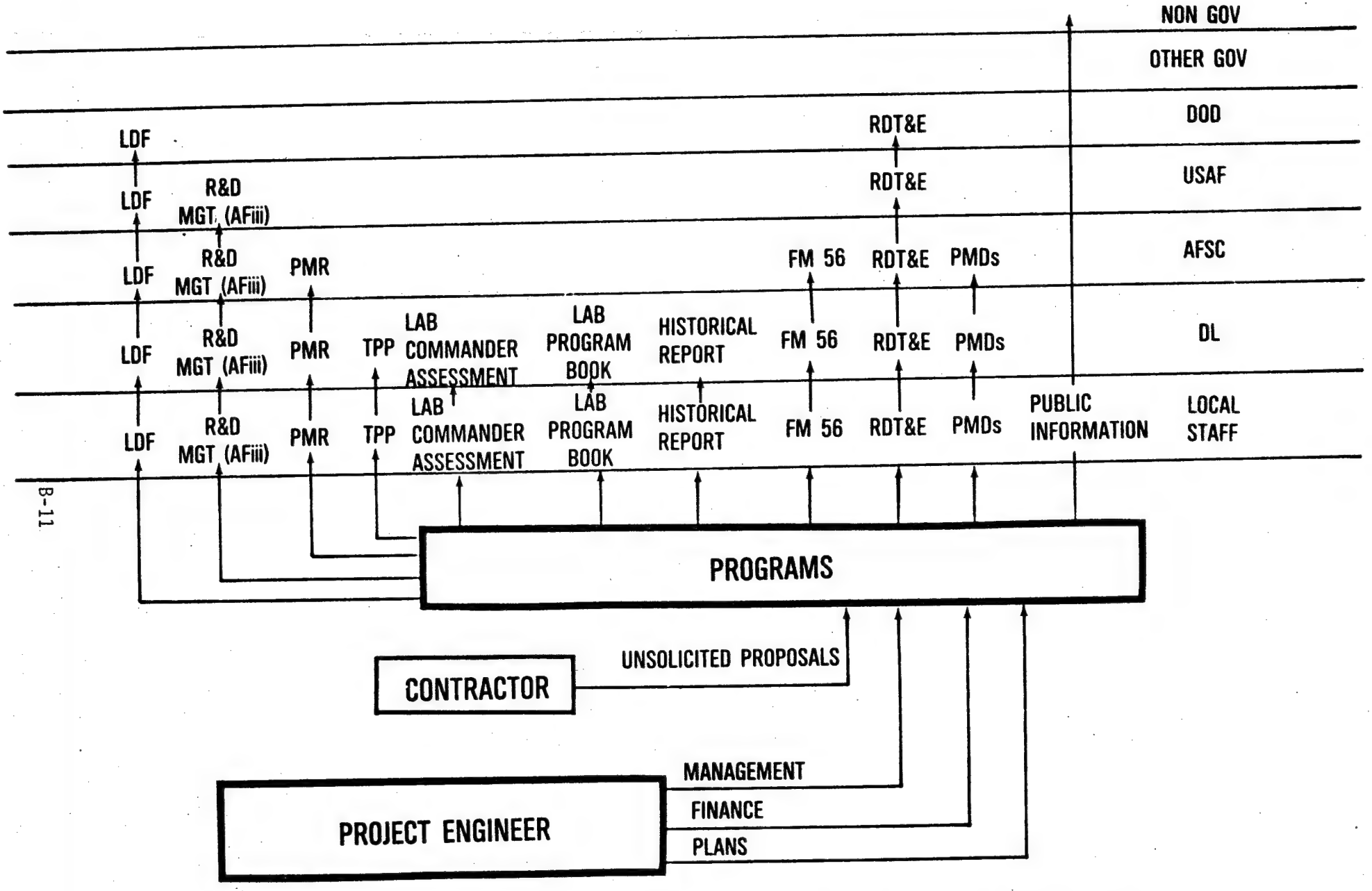

FIGURE B-5: GENERALIZED INFORMATION FLOWS FOR PROGRAMMING

One programming activity that deserves special attention is the information collection process for the annual RDT&E report. The process is time consuming and taps resources in the manpower, financial, facilities, and logistics functional areas. Data is collected on key punch cards and is forwarded to headquarters. This information is used by DOD for their integrated management analysis report. The DOD report is prepared by the U.S. Army Materiel Development and Readiness Command under the title Department of Defense In-House RDT&E Activities Management Analysis Report. The DOD report publication date is generally within thirty days after the close of the fiscal year. The following statement is included in the foreword of the DOD report.

> "It is desired that this publication be given widespread distribution in the DOD Laboratories as an internal management document at the Director and Commanding Officer level as well as at the bench level in order to allow personnel an opportunity to familiarize themselves with the functional capabilities of other DOD laboratories. It is hoped that by this means laboratory scientists and engineers will be encouraged to communicate with each other on common problems of interest to their service laboratories as well as to communicate with laboratories at the other services."

A check of line engineers and scientists in the laboratories revealed that a large percentage had never seen a copy of this DOD report. Many did not know the report existed. DL prepares a similar report using JOCAS and MASIS data. The report is entitled "AFSC Laboratory Operations Management Analysis Report." Unfortunately, the DL report is generally not available for distribution until one year after the close of the fiscal year. This is long after the DOD report has already been published.

This is only one example where close coordination of information requirements may be able to improve current processes and improve the timeliness of information. The DOD report discussed is particularly

important because it tends to be quoted by higher echelon personnel when summarizing various RDT&E activities.

4. FINANCIAL MANAGEMENT

Key financial management interfaces are shown in Figure B-6. The financial management function in the laboratories is a highly complex interaction among a number of key activities including comptroller service organizations, procurement organizations, DL staff offices, and HQ AFSC/AC. The Laboratory Business Management Conference in April of 1979 provided a wealth of information identifying key problem areas and recommended solutions. This information was collected in workshop reports published in February 1980. This information should be reviewed since many of the recommended action items have never been implemented.

There are several key areas identified during the Laboratory Business Management Conference that need to be highlighted. The first involves the need to clearly define areas of financial responsibility. A laboratory is sometimes faced with unclear or inconsistent guidance from HQ AFSC/AC, HQ AFSC/DL, and the local comptroller. Clearer financial management policy and procedures would go a long way toward solving this problem. The AFSC Comptroller organization and the Director of Laboratories staff offices must develop a well-coordinated process for financial management. This is a prerequisite to the development of any information system to support management needs in the financial area. The second problem involves redundant reporting to Headquarters AFSC. Rome Air Development Center (RADC) is in a unique position to investigate this problem in more detail since they have their own comptroller organization. RADC/AC receives direct guidance and information from both HQ AFSC/AC and HQ AFSC/DL. From this perspective it is clear that many requests for financial information from DL

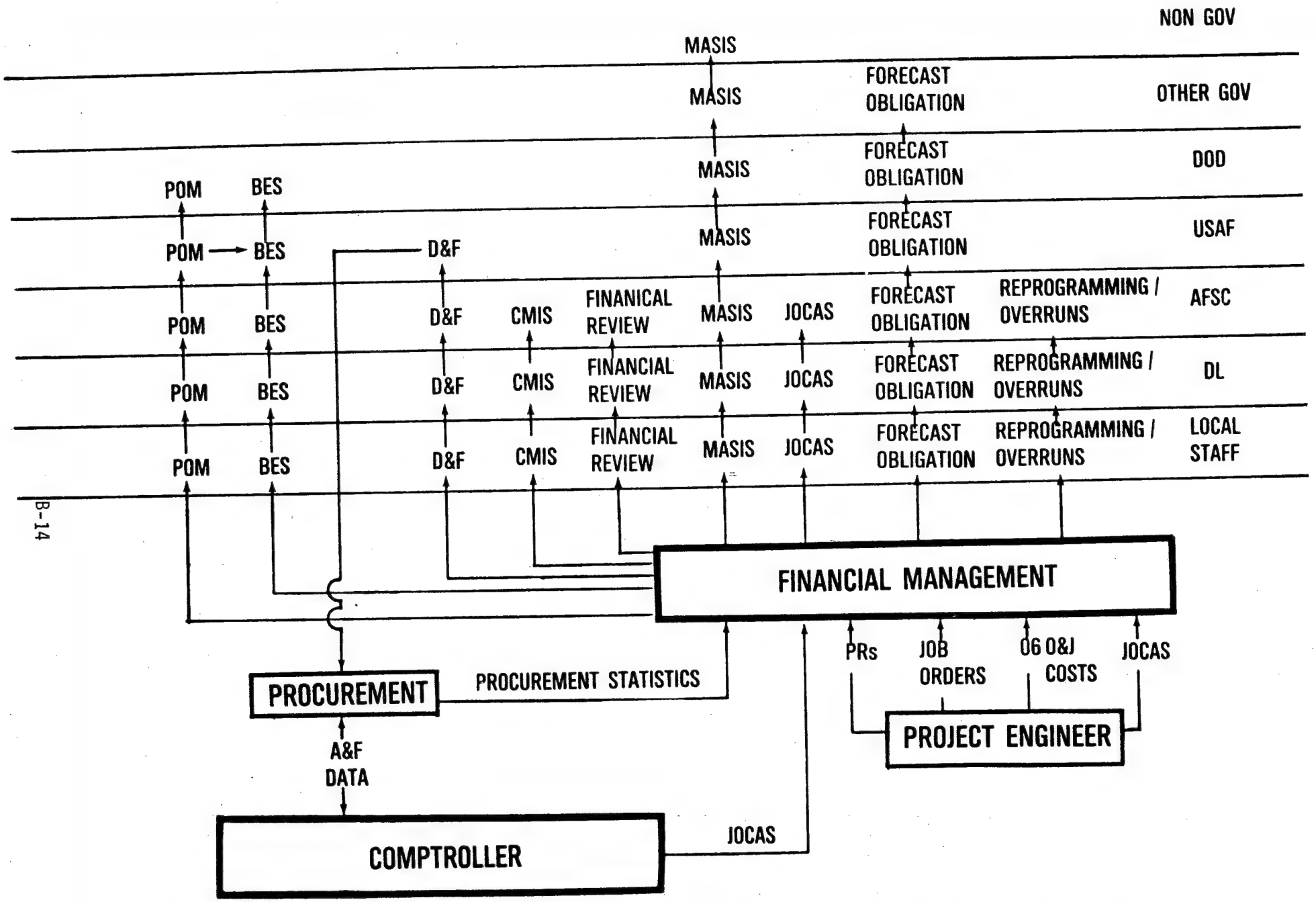

FIGURE B-6: GENERALIZED INFORMATION FLOWS FOR FINANCIAL MANAGEMENT

staff offices can be answered from data available at HQ AFSC/AC. In addition, much of the information covered in DL financial Reviews already exists at HQ AFSC/AC. A great deal of improvement in the financial operations area can be gained by integrating and streamlining AFSC financial policies and procedures.

5. MANPOWER AND PERSONNEL

Significant information flows in the area of manpower and personnel are shown in Figure B-7. This functional area is generally serviced by another organization, and must manage with information provided from a standard automated management information system (see Section II, Figure 6). As previously mentioned, standard MISs which have been created for a functional area are generally not flexible enough to meet user needs at the working level. The information needed by a CBPO will not necessarily be the same information required by a line branch chief. In addition, functional personnel offices have controls on information covered by the Privacy Act, such as date of birth, social security number, or service computation date and are reluctant to allow local user MISs to contain such information. However, most paperwork generated at a first-line management level requires such information forcing the local personnel office to keep duplicate files in order to validate information. Not only do they verify information required to process local personnel actions to the servicing CBPO, but they must also verify employee data and statistical information forwarded by the host CBPO since the updates to the automated personnel MIS are not necessarily processed as they occur. Although the information provided through CMIS has somewhat reduced calls from DL for personnel information, these data are manually kept and transmitted because most base systems cannot support an automated interface.

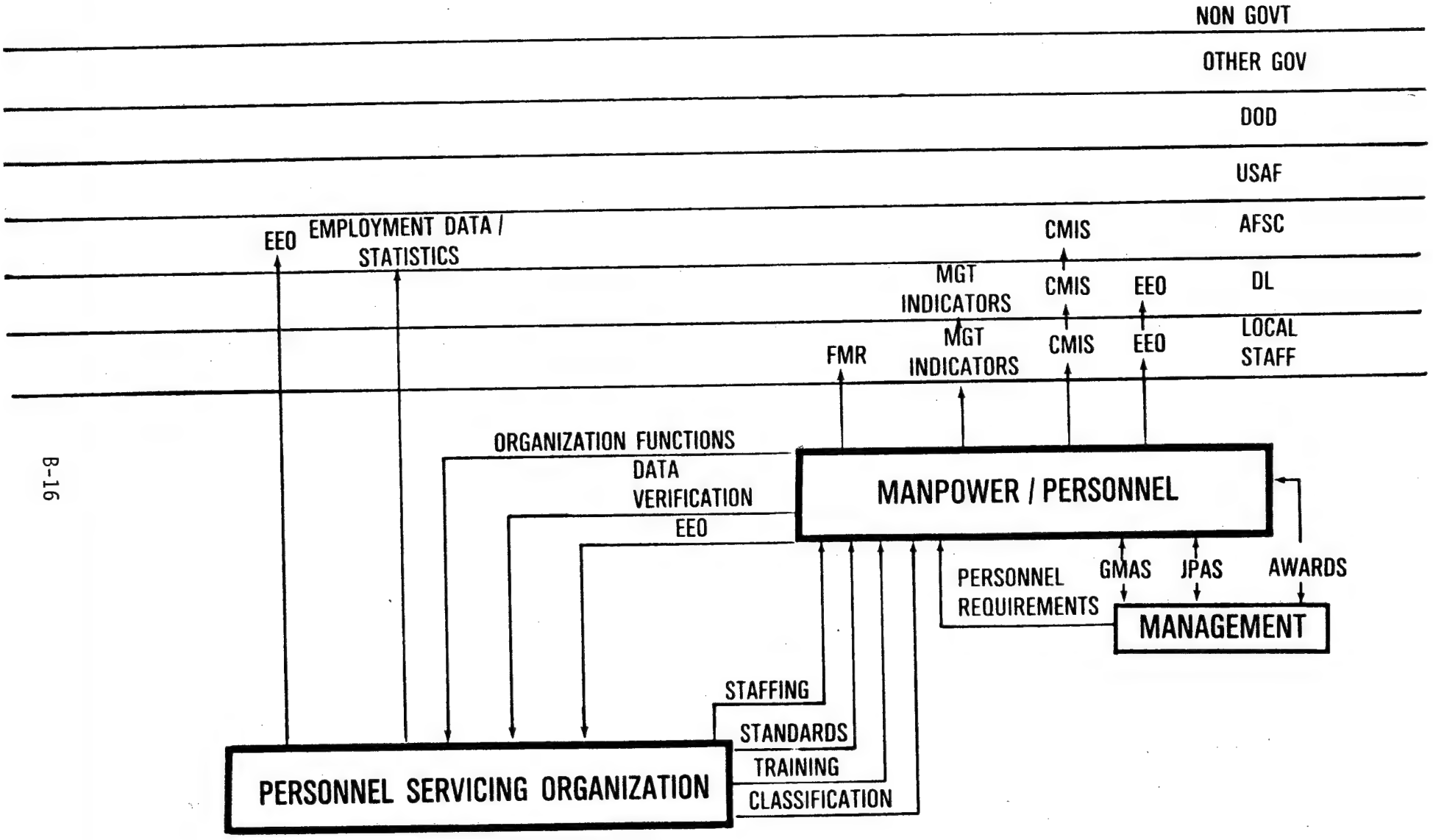

FIGURE B-7: GENERALIZED INFORMATION FLOWS FOR MANPOWER/PERSONNEL

Input from several laboratories has identified a coordination problem between HQ AFSC/AC IRM policies and the policies being implemented by headquarters manpower and personnel functions. The IRM policies clearly indicate that data from standard MIS should be made available to local organizations if desired to effectively implement IRM at the local level. This data is usually made available in tape form so that it can readily be entered into local systems for flexible reformatting to meet local needs. Local manpower and personnel organizations will not release personnel tapes without Headquarters AFSC approval. Headquarters manpower and personnel functions are reluctant to provide the necessary approvals. This type of coordination problem must be resolved at the headquarters level before significant information process improvements can be made at the local level.

6. FACILITIES AND LOGISTICS

Figure B-8 provides a simplified overview of the information processes involved in the functional areas of facilities and logistics. The most frequent cases of duplication in forwarding information products seem to occur when R&D organizations rely on other organizations for some type of support. One example involves the Military Construction Program documentation prepared by facilities personnel using in-house project engineer test requirements and construction details. This information, often consisting of several hundred pages, is prepared and forwarded to DL. Another copy is sent to the servicing Civil Engineering Office where the document is reformatted before being forwarded to civil engineering offices at AFSC and USAF. Data content is similar, but the cosmetics have changed. This concept of cosmetic changes for information seems to flourish as each laboratory attempts to respond to DL, AFSC, and servicing organization needs and requirements. A well-coordinated analysis of information requirements

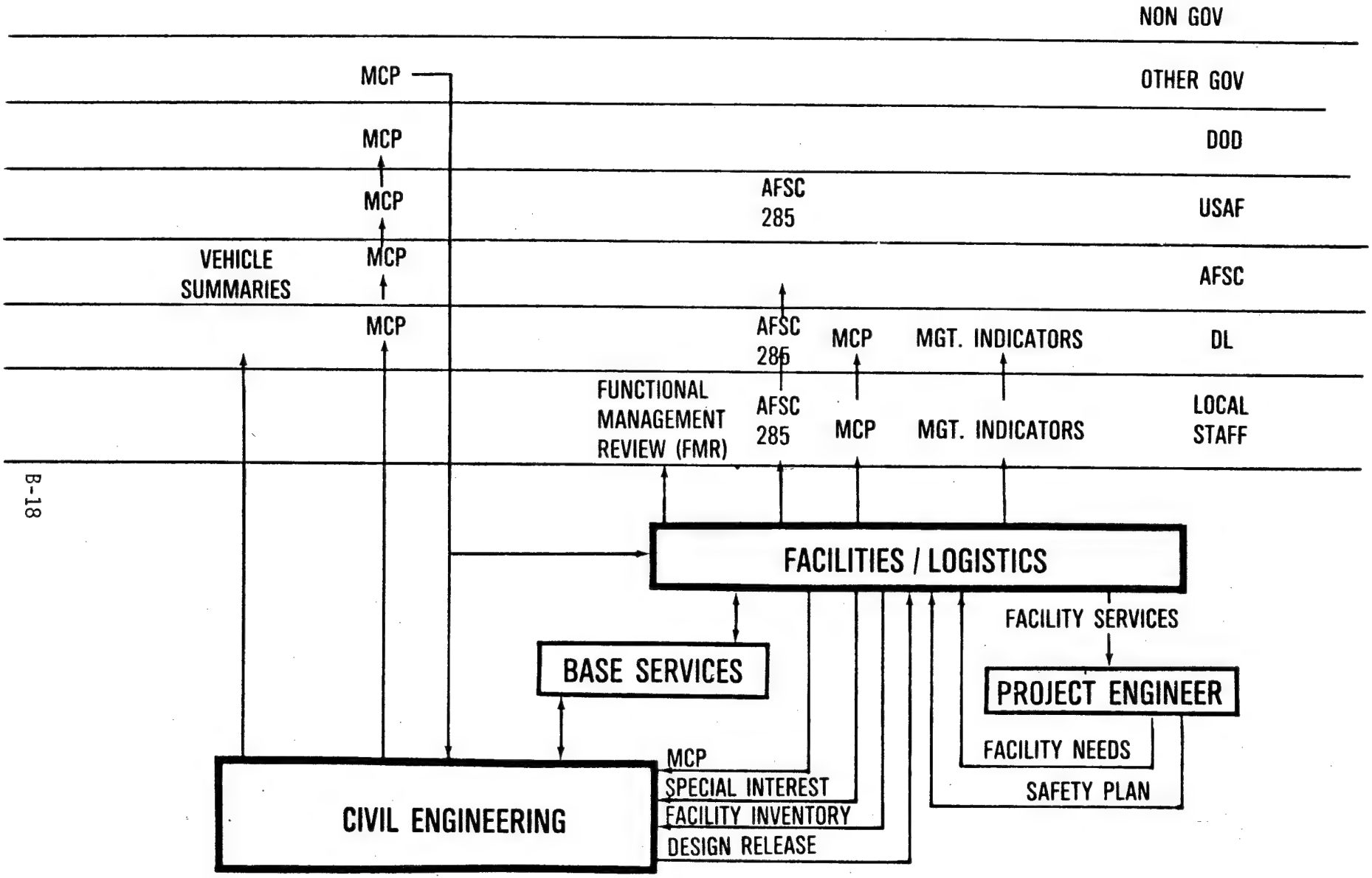

FIGURE B-8: GENERALIZED INFORMATION FLOWS FOR FACILITIES/LOGISTICS

at the headquarters level could eliminate much of the duplicate reporting that plagues most field organizations.

7. AUTOMATIC DATA PROCESSING MANAGEMENT

Two separate functions are depicted in Figure B-9. One involves the relatively new function of information resource management previously discussed. Currently, IRM is being handled through data administration channels tied directly to HQ AFSC/ACD. This approach provides both an internal and external channel to define information requirements and provides a level of control on information processes. The data administrator at the field level is required to coordinate and control the information processes at the laboratory level based on Headquarters AFSC policy and guidance. From an external viewpoint, the data administrators operate through HQ AFSC/ACD to ensure that command policy and procedures are realistic in the field environment.

The second area deals with conventional ADP management. The MCAP, UAMP, PAR, DAR process that forms the basis for ADP requirements approval and budgeting is relatively straightforward. However, many view the requirements imposed by this process as administrative overkill. The introduction of letter formats in place of full DARs for low value data automation items represented a significant breakthrough in reducing paperwork associated with the ADP acquisition process. In view of the explosion in low cost ADP technology, it may be feasible to request that AFR 300 requirements be limited to major ADP system acquisitions and that ADP equipment under a certain dollar threshold be exempt from the DAR process. Such an approach would streamline the ADP management process, focus management attention on larger system acquisitions, and significantly reduce the added work load imposed by AFR 300 series regulations.

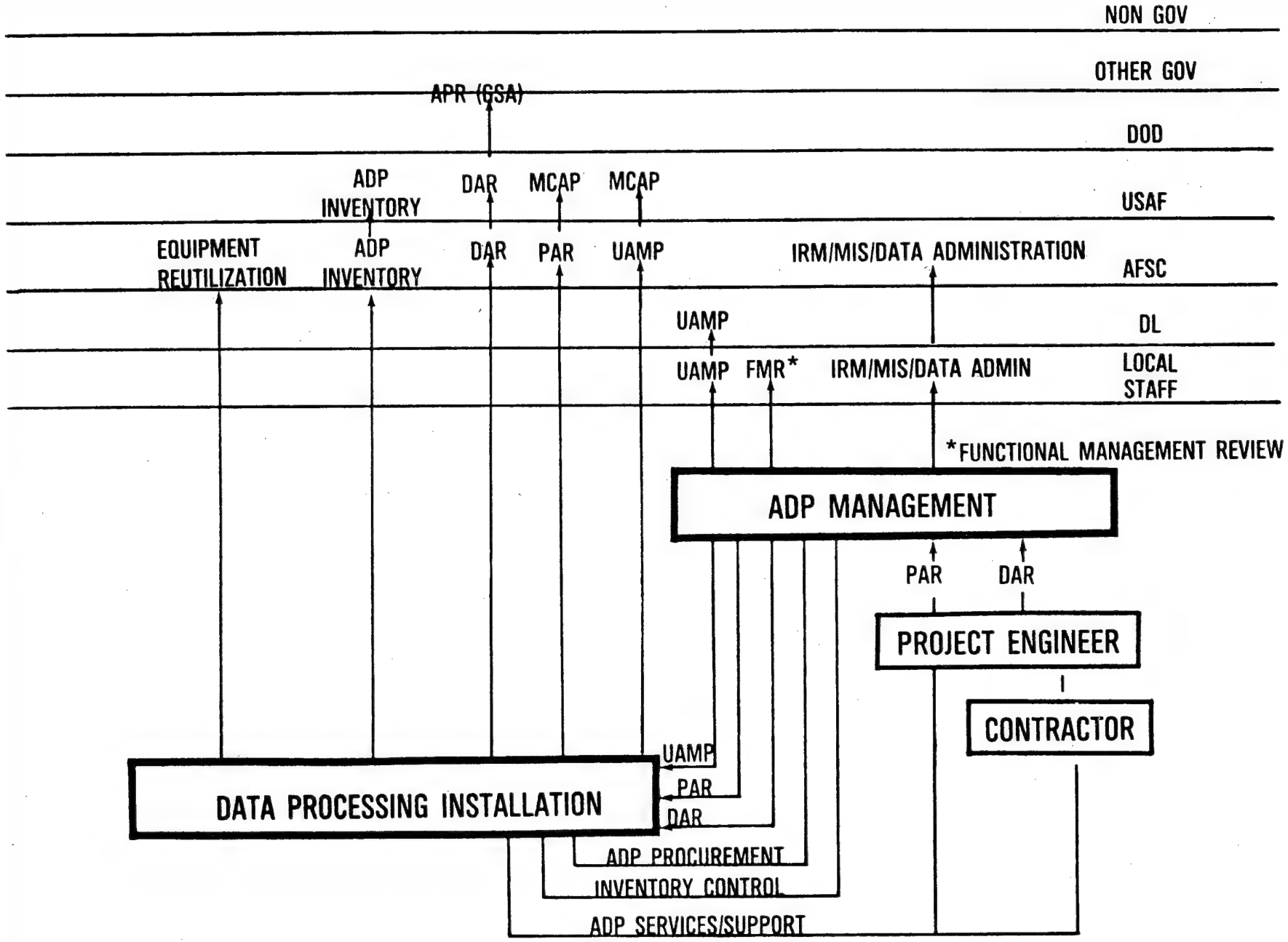

FIGURE B-9: GENERALIZED INFORMATION FLOWS FOR ADP MANAGEMENT

This portion of the report attempted to provide a realistic view of information flows in a simplified overview. The flows addressed information as it exists in definable products which are common to R&D organizations. These products contain aggregations and integrations of working level data and are generated to meet higher level management requirements.

APPENDIX C

MANAGEMENT INFORMATION PRODUCTS AND NEEDS

C. MANAGEMENT INFORMATION PRODUCTS AND NEEDS

1. MANAGEMENT INFORMATION PRODUCTS ANALYSIS

Appendix B addressed the problem of information flows among key organizations for several of the major laboratory business functions and project management which cuts across several business functions. In this section we will examine the management information products that are in use today and categorize the many management information needs that have been identified in available requirements studies. In this study we approached the identification of information products from two perspectives. The first dealt with products as viewed from HQ AFSC/DL. The DL Information Requirements Working Group, chaired by Lt Col Bob Baker, DLXM, identified 105 information products that were relatively common across all DL organizations. Table C-1 is a list of these 105 products. These products were then analyzed to determine their relationship to business functions and information classes. Each product was also categorized into three types of information--operational, tactical, and strategic. Finally, the products were prioritized in terms of high, medium, and low priority information products. The results of this analysis are summarized in Table C-2.

The second view represented a bottom-up approach. Several laboratories had conducted information work load surveys and information product studies. These efforts were reviewed to identify information products from the laboratory perspective. Over 50 additional information products were identified in laboratory studies. Table C-3 summarizes the results of these studies. Specific products that were identified in Tables C-1 and C-2 were not repeated in Table C-3. The laboratories identified a number of technical ccordination activities directly related to the research and

INFORMATION PRODUCTS

A. NON-RCS PRODUCTS

1. TECHNOLOGY PROGRAM PLANS
2. DETERMINATION & FINDING SUBMISSIONS
3. BUDGET CUT DATA (IMPACT STATEMENTS, PRIORITIZED LISTS)
4. LABORATORY MANAGEMENT REVIEW CHARTS
5. DRAFT PMDs AND AFSC FORMS 56
6. DRAFT DESCRIPTIVE SUMMARY WRITEUPS
7. VIEWGRAPHS, PICTURES, NARRATIVES, AND "FEELIES" TO SUPPORT CONGRESSIONAL BUDGET HEARINGS
8. COPIES OF CHARTS FOR FUNCTIONAL AREA REVIEWS
9. COPIES OF TECHNICAL REPORTS
10. INPUTS FOR PROGRAM FACT SHEETS, DATA SHEETS, SPARE DATA SHEETS
11. INPUTS FOR OSD TECHNICAL AREA DESCRIPTIONS
12. INPUTS FOR POINT PAPERS, BACKGROUND PAPERS, JLC POSITION PAPERS, TALKING PAPERS
13. BACKGROUND MATERIAL FOR STAFF PMRs
14. DATA EXCHANGE ACTIVITY REPORT (AFSC FORM 321)
15. PROJECTED INTERNATIONAL TRAVEL
16. INTERNATIONAL TRAVEL BUDGET SUBMISSION
17. ANNUAL LABORATORY OPERATIONS REPORT
18. REPORT OF ACTUAL EXPENSES FOR LABORATORY OPERATIONS
19. VERIFICATION OF LEVELS OF IN-HOUSE SCIENCE & TECHNOLOGY PROGRAM WORK
20. AFSC PROGRAM OBJECTIVE MEMORANDUM (POM) CALL
21. AFSC BUDGET ESTIMATE SUBMISSION (BES) CALL
22. UNFUNDED REQUIREMENT SUBMISSIONS
23. PROGRAM FINANCIAL REVIEW (PFR) SUBMISSION
24. CMIS-LS INPUTS
25. QUARTERLY OFFICER/ENLISTED BREAKOUT OF MILITARY MANNING
26. QUARTERLY LABORATORY MANAGEMENT INDICATOR SUBMISSION
27. INPUTS FOR LABORATORY CAPABILITIES BROCHURE
28. AGENDA FOR ANNUAL LABORATORY MANAGEMENT REVIEWS
29. COMMENTS ON DRAFT REGULATIONS AND MANUALS
30. MCP REQUESTS AND BACKUP MATERIAL
31. ADP REQUIREMENTS (PAR, DAR, UAMP)
32. MIS INVENTORY UPDATES
33. MIS STATUS REPORTS
34. VANGUARD INPUTS
35. LABORATORY TECHNICAL REVIEWS
36. INVESTMENT STRATEGY BRIEFINGS
37. RESEARCH PLANNING GUIDE INPUTS
38. TECHNICAL OBJECTIVES DOCUMENTS
39. RESPONSES TO REQUIREMENTS DOCUMENTS (SONs, TNs, LNs)
40. INPUTS ON LABORATORY PROGRAM REVIEWS (PMRs, LCARs, LABORATORY COMMANDER MANAGEMENT REVIEWS TO AFSC/CC)
41. TRAINING REQUIREMENTS (FOR AFIT SYS-420)
42. SUMMARY OF EVALUATIONS OF CONTRACTOR IR&D TECHNICAL PLANS
43. STATISTICAL REPORT ON IR&D PROJECT EVALUATIONS PERFORMED (AFSC FORM 315)
44. AFSC CORPORATE PLAN

TABLE C-1: DL INFORMATION PRODUCTS LIST

INFORMATION PRODUCTS

B. RCS PRODUCTS

1. MILITARY PERSONNEL AF REIMBURSEMENTS FORECAST, HAF-ACB (AR) 8101
2. DATA PROCESSING EQUIPMENT INVENTORY, HAF-ACD(M) 7104
3. MAJOR COMMAND AUTOMATIC DATA PROCUREMENT PLAN, HAF-ACD(A) 7303
4. DELEGATION OF PROCUREMENT AUTHORITY FOR ADP RESOURCE, HAF-ACD(Q) 7901
5. SPECIAL STUDY EXCHANGE ABSTRACT, HAF-ACM(SA) 7105
6. HISTORICAL REPORT, HAF-CVA(AR) 7101
7. REPORT OF DOCUMENTATION HOLD/DISP, HAF-DAP(A) 7112
8. FORMS MANAGEMENT PROGRESS REPORT, HAF-DAP(A) 7103
9. NOTICE OF APPROVAL FOR NEW OR REVISED ADMIN, HAF-DAY(AR) 7702
10. MONTHLY ADMINISTRATIVE SYSTEM PERFORMANCE, HAF-DAY(M) 7703
11. GROUND MISHAP & SAFETY EDUC SUMMARY REPORT, HAF-IGD(M) 7113
12. REPORT OF ADVERSE ACTIONS, HAF-IGS(AR) 7404
13. REPORT OF PACKAGING AND HANDLING DEFICIENCIES, HAF-LET(AR) 7302
14. HIRED MOTOR VEHICLE REPORT, HAF-LET(Q&A) 7501 PT C
15. SEMIANNUAL LIBRARY REPORT, HAF-MPC(SA) 7104
16. REQUEST TO ESTABLISH/CHANGE ADVANCED DEGREE POSITION, HAF-MPP(SA) 7127
17. R/D MANAGEMENT REPORT (AF FORM 111), HAF-RDP(AR) 7105
18. ANNUAL REPORT OF TEMPEST DISCREP/CORRECTIONS, HAF-XOK(A) 7303
19. OPSEC STATUS REPORT, HAF-XOO(A) 7106
20. OPERATIONS EVENT/INCIDENT REPORT (OPREP-3), HAF-XOO(AR) 7118
21. COMMANDER'S SITUATION REPORT (SITREP), HAF-XOO(AR)
22. NUCLEAR DETONATION REPORT (NUDET), HAF-XOO(AR) 7125
23. FINANCIAL FORECAST ANALYSIS REPORT, SYS-ACB(A/AR) 7601
24. REQUEST FOR APPROVAL OF RDT&E REPROGRAMMING, SYS-ACB(AR) 7801
25. RECURRING REPORT SURVEY, SYS-ACC(A) 7801
26. JOCAS MANAGEMENT INFORMATION REPORT TAPE, SYS-ACF(M) 7401
27. PUBS MGT PERSONNEL & WORK LOAD REPORT, SYS-DAP(A) 7801
28. AFSC MGMT/SCIENTIFIC INFO SYSTEM (MASIS), SYS-DL(AR) 7501
29. LABORATORY ACTIVITIES REPORT, SYS-DLX(W) 7302
30. LABORATORY RESEARCH/TECHNOLOGY PLANS, SYS-DLX(A) 7402
31. DATA INFORMATION EXCHANGE EVALUATION REPORT, SYS-DLX(A) 7801
32. AFSC R&D PLANNING & BUDGETING DATA BASE, SYS-DLX(A) 8001
33. LABORATORY SUPPLY EFFECTIVENESS REPORT, SYS-LGS(M) 7201
34. PHYSICAL FITNESS AND WEIGHT CONTROL, SYS-MPS(SA) 7801
35. REPORT OF UNSOLICITED PROPOSALS, SYS-PMP(SA) 7601
36. CONTRACTOR USE CORP FUNDS ON DOD PROGRAM, SYS-PMP(AR) 7702
37. AFSC LESSONS LEARNED, SYS-SDD(A) 7901
38. SERIOUS INCIDENT REPORT, SYS-SPO(AR) 7701
39. COMMAND OFAED/DFAE CHANGE REPORT, LOG-LO(W) 7702
40. PALACE MODE JOB DESCRIPTIONS, MPC-DPMDR(AR) 7404
41. MOBILIZATION AUGMENTEE END TOUR/TRAINING RPT, RPC-RTW(A) 7701
42. CONGRESSIONAL COMMITTEE INVESTIGATION/HEARING/VISIT REPORT, SAF-LL(AR) 7301
43. PRIVACY ACT REPORT OF NEW SYSTEM RECORDS, DD-A(A/AR) 1379
44. ADP SERVICE PROVIDED TO AGENCY/COMMERCIAL SOURCE, DD-COMP(Q) 1179
45. ADP MANAGEMENT INFORMATION SYSTEM, DD-COMP(AR) 996
46. R&D RESOURCE DATA FOR IN-HOUSE RDT&E ACTIVITIES, DD-DR/E(A) 1041
47. STATISTICAL SUMMARY OF VALUE ENGINEERING ACTIONS, DD-I/L(SA/A) 1138

TABLE C-1: DL INFORMATION PRODUCTS LIST (CONTINUED)

INFORMATION PRODUCTS

48. LOGISTICS RESEARCH REPORTS, DD-I/L(AR) 1196
49. SOLID WASTE MGT PROGRAM IMPLEMENTATION OPERATION, DD-I/L(A/AR) 1435
50. PROCEEDS FROM SALE OF RECYCLABLE MATERIALS, DD-I/L(A) 1436
51. FREEDOM FROM SALE OF RECYCLABLE MATERIALS, DD-I/L(A) 1365
52. AUDIOVISUAL ACTIVITIES ANNUAL REPORT, DD-PA(A) 1438
53. CONSOLIDATION/ELIMINATION OF AUDIOVISUAL ACTIVITY, DD-PA(Q) 1450
54. REPORT OF VIOLATION OF AFR 177-16, DD-SD(AR) 170
55. BIENNIAL REPORT ON STAT COMPROM EMANATIONS, DD-T(B) 1117
56. INSPECT GEN ACTION REQUEST CATEGORIZED DATA, ISC-IC(M) 7701
57. CONSOLIDATED COPYING INVENTORY COST/PROD REPORT, 0082-GSA-AR PTI
58. FEDERAL PRODUCTIVITY REPORT, 0169-NCP-AN
59. INFORMATION SECURITY PROGRAM DATA, 0230-GSA-SA
60. ANNUAL SURVEY/RDT&E/OTHER SCIENTIFIC ACT, 1155-NSF-AN
61. CERTIFIED REPORT OF OTHER ACCOUNTS RECEIVABLE, 1196-TD-AN

TABLE C-1: DL INFORMATION PRODUCTS LIST (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
CORPORATE PLANNING	AFSC CORPORATE PLAN INPUTS	PLANS GENERAL	STRATEGIC	HIGH
PLANNING	DRAFT DESCRIPTIVE SUMMARY WRITEUPS	PLANS TECHNICAL	TACTICAL	HIGH
PLANNING	INVESTMENT STRATEGY BRIEFINGS	PLANS TECHNICAL	TACTICAL	HIGH
PLANNING	LABORATORY RESEARCH/ TECHNOLOGY PLANS, SYS-DLX(A) 7402	PLANS BUDGET	STRATEGIC	HIGH
PLANNING	RESEARCH PLANNING GUIDE INPUTS	PLANS TECHNICAL SCIENTIFIC	TACTICAL	HIGH
PLANNING	TECHNICAL OBJECTIVES DOCUMENTS	PLANS TECHNICAL SCIENTIFIC	TACTICAL	HIGH
PLANNING	TECHNOLOGY PROGRAM PLANS	PLANS TECHNICAL FINANCIAL	STRATEGIC	HIGH
PLANNING	VANGUARD INPUTS	PLANS	STRATEGIC	HIGH
PROGRAMMING	AFSC LESSONS LEARNED, SYS-SDD(A) 7901	GENERAL	OPERATIONAL	MEDIUM
PROGRAMMING	AGENDA FOR ANNUAL LABORATORY MANAGEMENT REVIEWS	OPERATIONS	OPERATIONAL	MEDIUM

TABLE C-2: DL INFORMATION PRODUCTS ANALYSIS

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
PROGRAMMING	ANNUAL SURVEY/RDT&E/OTHER 1155-NSF-AN	TECHNICAL SCIENTIFIC	OPERATIONAL	MEDIUM
PROGRAMMING	BACKGROUND MATERIAL FOR STAFF PMRs	TECHNICAL FINANCIAL	OPERATIONAL	HIGH
PROGRAMMING	DATA INFORMATION EXCHANGE EVALUATION REPORT, SYS-DLX(A) 7801	TECHNICAL	OPERATIONAL	MEDIUM
PROGRAMMING	DRAFT PMDs AND AFSC FORMS 56	PROGRAMS	OPERATIONAL	HIGH
PROGRAMMING	FEDERAL PRODUCTIVITY REPORT, 0169-NCP-AN	OPERATIONS	OPERATIONAL	MEDIUM
PROGRAMMING	INPUTS FOR LABORATORY CAPABILITIES BROCHURE	TECHNICAL FACILITIES	OPERATIONAL	MEDIUM
PROGRAMMING	INPUTS FOR POINT PAPERS, BACKGROUND PAPERS, JLC POSITION PAPERS, TALKING PAPERS	GENERAL TECHNICAL FINANCIAL	OPERATIONAL	HIGH
PROGRAMMING	INPUTS FOR PROGRAM FACT SHEETS, DATA SHEETS, SPARE DATA SHEETS	GENERAL TECHNICAL FINANCIAL	OPERATIONAL	HIGH
PROGRAMMING	INPUTS ON LABORATORY PROGRAM REVIEWS (PMRs, LCARs, LABORATORY COMMANDER MANAGEMENT REVIEWS TO AFSC/CC)	GENERAL OPERATIONS	OPERATIONAL	HIGH

TABLE C-2: DL INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
PROGRAMMING	LABORATORY ACTIVITIES REPORT, SYS-DLX(W) 7302	TECHNICAL	OPERATIONAL	HIGH
PROGRAMMING	LABORATORY MANAGEMENT REVIEW CHARTS	OPERATIONS	OPERATIONAL	HIGH
PROGRAMMING	LOGISTICS RESEARCH REPORTS, DD-I/L(AR) 1196	TECHNICAL LOGISTICS	OPERATIONAL	MEDIUM
PROGRAMMING	QUARTERLY LABORATORY MANAGEMENT INDICATOR SUBMISSION	OPERATIONS	OPERATIONAL	MEDIUM
PROGRAMMING	R/D MANAGEMENT REPORT (AF FORM 111), HAF-RDP(AR) 7105	TECHNICAL SCIENTIFIC	OPERATIONAL	HIGH
PROGRAMMING	REPORT OF UNSOLICITED PROPOSALS, SYS-PMP(SA) 7601	PROCUREMENT	OPERATIONAL	MEDIUM
PROGRAMMING	SPECIAL STUDY EXCHANGE ABSTRACT, HAF-ACM(SA) 7105	TECHNICAL	OPERATIONAL	MEDIUM
PROGRAMMING	STATISTICAL REPORT ON IR&D PROJECT EVALUATIONS PERFORMED (AFSC FORM 315)	ADMINISTRATIVE DOCUMENTATION	OPERATIONAL	MEDIUM
PROGRAMMING	STATISTICAL SUMMARY OF VALUE ENGINEERING ACTIONS, DD-I/L(SA/A) 1138	ADMINISTRATIVE	OPERATIONAL	LOW

TABLE C-2: DL INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
PROGRAMMING	SUMMARY OF EVALUATIONS OF CONTRACTOR IR&D TECHNICAL PLANS	TECHNICAL	OPERATIONAL	MEDIUM
PROGRAMMING	VIEWGRAPHS, PICTURES, NARRATIVES, AND "FEELIES" TO SUPPORT CONGRESSIONAL BUDGET HEARINGS	BUDGET TECHNICAL	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	AFSC BUDGET ESTIMATE SUBMISSION (BES) CALL	BUDGET	TACTICAL	HIGH
FINANCIAL MANAGEMENT	AFSC PROGRAM OBJECTIVE MEMORANDUM (POM) CALL	BUDGET PLANS	STRATEGIC	HIGH
FINANCIAL MANAGEMENT	ANNUAL LABORATORY OPERATIONS REPORT	BUDGET	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	BUDGET CUT DATA (IMPACT STATEMENTS, PRIORITIZED LISTS)	BUDGET TECHNICAL	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	CERTIFIED REPORT OF OTHER ACCOUNTS RECEIVABLE, 1196-TD-AN	FINANCIAL	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	FINANCIAL FORECAST ANALYSIS REPORT, SYS-ACB(A/AR) 7601	BUDGET	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	INTERNATIONAL TRAVEL BUDGET SUBMISSION	BUDGET	OPERATIONAL	MEDIUM

TABLE C-2: DL INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
FINANCIAL MANAGEMENT	MILITARY PERSONNEL AF REIMBURSEMENTS FORECAST, HAF-ACB(AR) 8101	BUDGET	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	PROGRAM FINANCIAL REVIEW (PFR) SUBMISSION	FINANCIAL	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	REPORT OF ACTUAL EXPENSES FOR LABORATORY OPERATIONS	BUDGET	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	REPORT OF VIOLATION OF AFR 177-16, DD-SD(AR) 170	FINANCIAL	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	REQUEST FOR APPROVAL OF RDT&E REPROGRAMMING, SYS-ACB(AR) 7801	BUDGET	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	UNFUNDED REQUIREMENT SUBMISSIONS	BUDGET	OPERATIONAL	HIGH
MANPOWER/ PERSONNEL	MOBILIZATION AUGMENTEE END TOUR/TRAINING RPT, RPC-RTW(A) 7701	MANPOWER	OPERATIONAL	LOW
MANPOWER/ PERSONNEL	PALACE MODE JOB DESCRIPTIONS, MPC-DPMDR(AR) 7404	PERSONNEL	OPERATIONAL	MEDIUM
MANPOWER/ PERSONNEL	PHYSICAL FITNESS AND WEIGHT CONTROL, SYS-MPS(SA) 7801	PERSONNEL ADMINISTRATIVE	OPERATIONAL	LOW

TABLE C-2: DL INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
MANPOWER/ PERSONNEL	QUARTERLY OFFICER/ ENLISTED BREAKOUT OF MILITARY MANNING	MANPOWER	OPERATIONAL	MEDIUM
MANPOWER/ PERSONNEL	REPORT OF ADVERSE ACTIONS, HAF-IGS(AR) 7404	PERSONNEL	OPERATIONAL	MEDIUM
MANPOWER/ PERSONNEL	REQUEST TO ESTABLISH/ CHANGE ADVANCED DEGREE POSITION, HAF-MPP(SA) 7127	MANPOWER	OPERATIONAL	MEDIUM
MANPOWER/ PERSONNEL	TRAINING REQUIREMENTS (FOR AFIT SYS-420)	PERSONNEL	OPERATIONAL	MEDIUM
RESEARCH & DEVELOPMENT	COPIES OF CHARTS FOR FUNCTIONAL AREA REVIEWS	TECHNICAL SCIENTIFIC	TACTICAL	HIGH
RESEARCH & DEVELOPMENT	COPIES OF TECHNICAL REPORTS	TECHNICAL SCIENTIFIC	OPERATIONAL	HIGH
RESEARCH & DEVELOPMENT	INPUTS FOR OSD TECHNICAL AREA DESCRIPTIONS	TECHNICAL SCIENTIFIC	OPERATIONAL	HIGH
RESEARCH & DEVELOPMENT	LABORATORY TECHNICAL REVIEWS	TECHNICAL SCIENTIFIC	OPERATIONAL	HIGH
RESEARCH & DEVELOPMENT	R&D RESOURCE DATA FOR IN-HOUSE RDT&E ACTIVITIES, DD-DR/E(A) 1041	PROGRAMS FACILITIES RESOURCES	OPERATIONAL	MEDIUM
RESEARCH & DEVELOPMENT	RESPONSES TO REQUIREMENTS DOCUMENTS (SONs, TNs, LNs)	PROGRAMS TECHNICAL SCIENTIFIC	OPERATIONAL	HIGH

TABLE C-2: DL INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
RESEARCH & DEVELOPMENT	VERIFICATION OF LEVELS OF IN-HOUSE SCIENCE & TECHNOLOGY PROGRAM WORK	PROGRAMS FINANCIAL	OPERATIONAL	MEDIUM
FACILITIES	MCP REQUESTS AND BACKUP MATERIAL	FACILITIES TECHNICAL FINANCIAL	OPERATIONAL	HIGH
PROCUREMENT/ CONTRACTING	CONTRACTOR USE CORP FUNDS ON DOD PROGRAM, SYS-PMP(AR) 7702	PROCUREMENT FINANCIAL	OPERATIONAL	MEDIUM
PROCUREMENT/ CONTRACTING	DETERMINATION & FINDING SUBMISSIONS	PROCUREMENT	TACTICAL	HIGH
OPERATIONS & LOGISTICS	ANNUAL REPORT OF TEMPEST DISCREP/CORRECTIONS, HAF-XOK(A) 7303	SECURITY	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	AUDIOVISUAL ACTIVITIES ANNUAL REPORT, DD-PA(A) 1438	SUPPLY	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	BIENNIAL REPORT ON STAT COMPROM EMANATIONS, DD-T(B) 1117	SECURITY	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	COMMAND OFAED/DFAE CHANGE REPORT, LOG-LO(W) 7702	SUPPLY	OPERATIONAL	HIGH
OPERATIONS & LOGISTICS	COMMANDER'S SITUATION REPORT (SITREP), HAF-XOO(AR)	SECURITY	OPERATIONAL	HIGH

TABLE C-2: DL INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
OPERATIONS & LOGISTICS	CONSOLIDATION/ELIMINATION OF AUDIOVISUAL ACTIVITY, DD-PA(Q) 1450	SUPPLY	OPERATIONAL	LOW
OPERATIONS & LOGISTICS	GROUND MISHAP & SAFETY EDUC SUMMARY REPORT, HAF-IGD(M) 7113	SAFETY	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	HIRED MOTOR VEHICLE REPORT, HAF-LET(Q&A) 7501 PT C	TRANSPORTATION	OPERATIONAL	LOW
OPERATIONS & LOGISTICS	INFORMATION SECURITY PROGRAM DATA, 0230-GSA-SA	SECURITY	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	LABORATORY SUPPLY EFFECTIVENESS REPORT, SYS-LGS(M) 7201	SUPPLY	OPERATIONAL	HIGH
OPERATIONS & LOGISTICS	NUCLEAR DETONATION REPORT (NUDET), HAS-XOO(AR) 7125	SECURITY	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	OPERATIONS EVENT/INCIDENT REPORT (OPREP-3), HAF-XOO(AR) 7118	SECURITY	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	OPSEC STATUS REPORT, HAF-XOO(A) 7106	SECURITY	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	PROCEEDS FROM SALE OF RECYCLABLE MATERIALS, DD-I/L(A) 1436	FACILITIES FINANCIAL	OPERATIONAL	LOW

TABLE C-2: DL INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
OPERATIONS & LOGISTICS	REPORT OF PACKAGING AND HANDLING DEFICIENCIES, HAF-LET(AR) 7302	SUPPLY	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	SERIOUS INCIDENT REPORT, SYS-SPO(AR) 7701	SAFETY	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	SOLID WASTE MGT PROGRAM IMPLEMENTATION OPERATION, DD-I/L(A/AR) 1435	FACILITIES	OPERATIONAL	MEDIUM
ADMINISTRATION	COMMENTS ON DRAFT REGULATIONS AND MANUALS	POLICY REGULATIONS	OPERATIONAL	MEDIUM
ADMINISTRATION	CONGRESSIONAL COMMITTEE INVESTIGATION/HEARING/ VISIT REPORT, SAF-LL(AR) 7301	DOCUMENTATION	OPERATIONAL	MEDIUM
ADMINISTRATION	CONSOLIDATED COPYING INVENTORY COST/PROD REPORT, 0082-GSA-AR PTI	DOCUMENTATION	OPERATIONAL	LOW
ADMINISTRATION	DATA EXCHANGE ACTIVITY REPORT (AFSC FORM 321)	DOCUMENTATION	OPERATIONAL	MEDIUM
ADMINISTRATION	FORMS MANAGEMENT PROGRESS REPORT, HAF-DAP(A) 7103	DOCUMENTATION	OPERATIONAL	MEDIUM
ADMINISTRATION	FREEDOM OF INFORMATION ACT REPORT, DD-PA(TRA&A) 1365	DOCUMENTATION	OPERATIONAL	MEDIUM

TABLE C-2: DL INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
ADMINISTRATION	HISTORICAL REPORT, HAF-CVA(AR) 7101	DOCUMENTATION	OPERATIONAL	MEDIUM
ADMINISTRATION	INSPECT GEN ACTION REQUEST CATEGORIZED DATA, ISC-IC(M) 7701	DOCUMENTATION	OPERATIONAL	MEDIUM
ADMINISTRATION	MONTHLY ADMINISTRATIVE SYSTEM PERFORMANCE, HAF-DAY(M) 7703	DOCUMENTATION	OPERATIONAL	LOW
ADMINISTRATION	NOTICE OF APPROVAL FOR NEW OR REVISED ADMIN, HAF-DAY(AR) 7702	DOCUMENTATION	OPERATIONAL	MEDIUM
ADMINISTRATION	PRIVACY ACT REPORT OF NEW SYSTEM RECORDS, DD-A(A/AR) 1379	DOCUMENTATION	OPERATIONAL	MEDIUM
ADMINISTRATION	PROJECTED INTERNATIONAL TRAVEL	DOCUMENTATION	OPERATIONAL	MEDIUM
ADMINISTRATION	PUBS MGT PERSONNEL & WORK LOAD REPORT, SYS-DAP(A) 7801	DOCUMENTATION	OPERATIONAL	LOW
ADMINISTRATION	REPORT OF DOCUMENTATION HOLD/DISP, HAF-DAA(A) 7112	DOCUMENTATION	OPERATIONAL	MEDIUM
ADMINISTRATION	SEMIANNUAL LIBRARY REPORT, HAF-MPC(SA) 7104	DOCUMENTATION	OPERATIONAL	MEDIUM

TABLE C-2: DL INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
INFO RESOURCE MANAGEMENT	ADP MANAGEMENT INFORMATION SYSTEM, DD-COMP(AR) 996	ADP INVENTORY	OPERATIONAL	MEDIUM
INFO RESOURCE MANAGEMENT	ADP REQUIREMENTS (PAR, DAR, UAMP	ADP PLANS FINANCIAL	TACTICAL	HIGH
INFO RESOURCE MANAGEMENT	ADP SERVICE PROVIDED TO AGENCY/COMMERCIAL SOURCE, DD-COMP(Q) 1179	ADP PROCUREMENT	OPERATIONAL	MEDIUM
INFO RESOURCE MANAGEMENT	AFSC MGMT/SCIENTIFIC INFO SYSTEM (MASIS), SYS-DL(AR) 7501	TECHNICAL FINANCIAL PROCUREMENT	OPERATIONAL	HIGH
INFO RESOURCE MANAGEMENT	AFSC R&D PLANNING & BUDGETING DATA BASE, SYS-DLX(A) 8001	PLANS BUDGET	TACTICAL	HIGH
INFO RESOURCE MANAGEMENT	CMIS-LS INPUTS	PROGRAMS MANPOWER FINANCIAL	OPERATIONAL	HIGH
INFO RESOURCE MANAGEMENT	DATA PROCESSING EQUIPMENT INVENTORY, HAF-ACD(M) 7104	ADP INVENTORY	OPERATIONAL	MEDIUM
INFO RESOURCE MANAGEMENT	DELEGATION OF PROCUREMENT AUTHORITY FOR ADP RESOURCE, HAF-ACD(Q) 7901	ADP PROCUREMENT	OPERATIONAL	MEDIUM
INFO RESOURCE MANAGEMENT	JOCAS MANAGEMENT INFORMATION REPORT TAPE, SYS-ACF(M) 7401	FINANCIAL	OPERATIONAL	HIGH

TABLE C-2: DL INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
INFO RESOURCE MANAGEMENT	MAJOR COMMAND AUTOMATIC DATA PRODUREMENT PLAN, HAF-ACD(A) 7303	ADP PLANS BUDGET	STRATEGIC	MEDIUM
INFO RESOURCE MANAGEMENT	MIS INVENTORY UPDATES	INVENTORY	OPERATIONAL	MEDIUM
INFO RESOURCE MANAGEMENT	MIS STATUS REPORTS	DOCUMENTATION	OPERATIONAL	MEDIUM
INFO RESOURCE MANAGEMENT	RECURRING REPORT SURVEY, SYS-ACC(A) 7801	ADMINISTRATIVE	OPERATIONAL	MEDIUM

TABLE C-2: DL INFORMATION PRODUCTS ANALYSIS (CONTINUED

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
PLANNING	INVESTMENT ASSESSMENT INTERSECTION DESCRIPTIONS	PLANS TECHNICAL SCIENTIFIC	OPERATIONAL	MEDIUM
PLANNING	OSR RESEARCH PLAN (6.1)	PLANS TECHNICAL SCIENTIFIC FINANCIAL	TACTICAL	HIGH
PLANNING	R&D PLANNING AND BUDGETING FILE (DD 1634)	PLANS TECHNICAL FINANCIAL	OPERATIONAL	MEDIUM
PROGRAMMING	D&F REVIEW	TECHNICAL CONTRACTS	OPERATIONAL	HIGH
PROGRAMMING	TECHNICAL SPECIALITIES WRITE-UPS	CONTRACTS LOGISTICS	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	AF AUDIT AGENCY REVIEWS	FINANCIAL PROCUREMENT CONTRACTS	OPERATIONAL	HIGH
MANPOWER/ PERSONNEL	CIVILIAN MERIT APPRAISALS	PERSONNEL	OPERATIONAL	MEDIUM
MANPOWER/ PERSONNEL	CIVILIAN/MILITARY AWARDS	PERSONNEL	OPERATIONAL	MEDIUM
MANPOWER/ PERSONNEL	CIVILIAN PERFORMANCE RATINGS	PERSONNEL	OPERATIONAL	MEDIUM

TABLE C-3: LABORATORY INFORMATION PRODUCTS ANALYSIS

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
MANPOWER/ PERSONNEL	EQUAL EMPLOYMENT OPPORTUNITY PROGRAM REPORT (QUARTERLY)	PERSONNEL	OPERATIONAL	MEDIUM
MANPOWER/ PERSONNEL	OFFICER EFFECTIVENESS REPORTS (OERs)	PERSONNEL	OPERATIONAL	MEDIUM
MANPOWER/ PERSONNEL	PERSONNEL ACTION DOCUMENTATION	PERSONNEL	OPERATIONAL	HIGH
MANPOWER/ PERSONNEL	QUARTERLY OUTSTANDING ACHIEVEMENT WRITE-UPS	PERSONNEL TECHNICAL GENERAL	OPERATIONAL	MEDIUM
MANPOWER/ PERSONNEL	TRAINING SURVEYS	PERSONNEL	TACTICAL	MEDIUM
RESEARCH & DEVELOPMENT	AFOSR REVIEWS (6.1)	TECHNICAL SCIENTIFIC	TACTICAL	HIGH
RESEARCH & DEVELOPMENT	AFSC/STAG REVIEWS OF 6.1	TECHNICAL SCIENTIFIC	STRATEGIC	HIGH
RESEARCH & DEVELOPMENT	BRIEFINGS TO INDUSTRY	TECHNICAL SCIENTIFIC	TACTICAL	HIGH
RESEARCH & DEVELOPMENT	CENSUS OF DOD MANUFACTURING ACTIVITIES	TECHNICAL FACILITIES	OPERATIONAL	LOW
RESEARCH & DEVELOPMENT	DAG REVIEWS	TECHNICAL SCIENTIFIC	STRATEGIC	HIGH

TABLE C-3: LABORATORY INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
RESEARCH & DEVELOPMENT	DST TECHNICAL PROGRAM REVIEW	TECHNICAL SCIENTIFIC	TACTICAL	HIGH
RESEARCH & DEVELOPMENT	FEDERAL LABORATORY CONSORTIUM FOR TECHNOLOGY TRANSFER REPORT	TECHNICAL SCIENTIFIC	OPERATIONAL	MEDIUM
RESEARCH & DEVELOPMENT	LABORATORY DIRECTOR'S FUND REVIEW/REPORT	TECHNICAL SCIENTIFIC FINANCIAL	OPERATIONAL	HIGH
RESEARCH & DEVELOPMENT	MONTHLY/QUARTERLY STATUS REPORTS (6.3)	PROGRAMS TECHNICAL FINANCIAL	OPERATIONAL	MEDIUM
RESEARCH & DEVELOPMENT	NASA/AFSC INTERDEPENDENCY REVIEW	TECHNICAL SCIENTIFIC	TACTICAL	MEDIUM
RESEARCH & DEVELOPMENT	OUSDR&E APPORTIONMENT REVIEW	TECHNICAL SCIENTIFIC	TACTICAL	HIGH
RESEARCH & DEVELOPMENT	OUSDR&E INVESTMENT ASSESSMENT OVERVIEW	TECHNICAL SCIENTIFIC	TACTICAL	HIGH
RESEARCH & DEVELOPMENT	PERIODIC TECHNICAL MANAGEMENT REVIEWS	TECHNICAL SCIENTIFIC	OPERATIONAL	HIGH
RESEARCH & DEVELOPMENT	PROGRAM REVIEWS (6.3/6.4)	TECHNICAL SCIENTIFIC FINANCIAL	OPERATIONAL	HIGH
RESEARCH & DEVELOPMENT	SAB REVIEW 6.1	TECHNICAL SCIENTIFIC	TACTICAL	HIGH

TABLE C-3: LABORATORY INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
RESEARCH & DEVELOPMENT	SPECIAL REVIEWS (AIR STAFF, OUSDR&E)	TECHNICAL SCIENTIFIC	OPERATIONAL	HIGH
RESEARCH & DEVELOPMENT	TECHNOLOGY COORDINATING PAPERS (TCP'S)	TECHNICAL SCIENTIFIC	TACTICAL	MEDIUM
RESEARCH & DEVELOPMENT	TOPICAL REVIEW	TECHNICAL SCIENTIFIC	TACTICAL	HIGH
TEST & EVALUATION	AFSC/TE REVIEWS OF FLIGHT TEST PROGRAMS/AIRCRAFT MIX	TESTING OPERATIONS	OPERATIONAL	MEDIUM
TEST & EVALUATION	NON AFSC TEST AND EVALUATION WAIVERS	TESTING FACILITIES OPERATIONS	OPERATIONAL	LOW
PROCUREMENT/ CONTRACTING	CONTRACTORS' PERFORMANCE REPORTS	CONTRACTS ADMINISTRATIVE	OPERATIONAL	MEDIUM
PROCUREMENT/ CONTRACTING	CONTRACTS/SOW	PROCUREMENT CONTRACTS ADMINISTRATIVE	OPERATIONAL	HIGH
PROCUREMENT/ CONTRACTING	DATA ITEM DESCRIPTIONS	PROCUREMENT CONTRACTS ADMINISTRATIVE	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	COMMUNICATIONS EQUIPMENT INVENTORY	COMMUNICATIONS EQUIPMENT INVENTORY	OPERATIONAL	LOW
OPERATIONS & LOGISTICS	GAO INSPECTION REPORTS	OPERATIONS GENERAL	OPERATIONAL	HIGH

TABLE C-3: LABORATORY INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
OPERATIONS & LOGISTICS	MATERIAL RESOURCES MANAGEMENT REPORTS	OPERATIONS SUPPLY EQUIPMENT	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	PME/PMI REPORTS	EQUIPMENT MAINTENANCE INVENTORY	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	USAF/AFSC INSPECTOR GENERAL REVIEWS	OPERATIONS GENERAL	OPERATIONAL	HIGH
ADMINISTRATION	FILE PLANS	ADMINISTRATIVE DOCUMENTATION	OPERATIONAL	LOW
ADMINISTRATION	INTERNATIONAL COOPERATIVE ACTIVITIES REPORT (QUARTERLY)	ADMINISTRATIVE	OPERATIONAL	LOW
ADMINISTRATION	PUBLICATION RELEASES	ADMINISTRATIVE	OPERATIONAL	MEDIUM
ADMINISTRATION	READABILITY OF PUBLICATIONS REPORT	ADMINISTRATIVE DOCUMENTATION	OPERATIONAL	LOW
ADMINISTRATION	RECORDS STAGING INVENTORY	ADMINISTRATIVE DOCUMENTATION	OPERATIONAL	LOW
ADMINISTRATION	RESEARCH AND DEVELOPMENT CASE FILES	ADMINISTRATIVE DOCUMENTATION	OPERATIONAL	MEDIUM
ADMINISTRATION	STAFF ASSISTANCE VISIT DOCUMENTATION	ADMINISTRATIVE GENERAL	OPERATIONAL	MEDIUM

TABLE C-3: LABORATORY INFORMATION PRODUCTS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION PRODUCT	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
ADMINISTRATION	TDY SPECIAL JUSTIFICATION	ADMINISTRATIVE DOCUMENTATION	OPERATIONAL	LOW
INFO RESOURCE MANAGEMENT	JOCAS REPORTS	FINANCIAL	OPERATIONAL	HIGH
INFO RESOURCE MANAGEMENT	MASIS REPORTS	TECHNICAL SCIENTIFIC FINANCIAL	OPERATIONAL	MEDIUM

TABLE C-3: LABORATORY INFORMATION PRODUCTS ANALYSIS (CONTINUED)

development business function. These activities generally result in exchange of technical information in some form and represent a significant work load in terms of administrative effort and time. A review of Tables C-2 and C-3 gives an indication of the magnitude of information that is relatively common for all DL organizations. An examination of unique internal laboratory information flows would complicate the situation even further.

2. MANAGEMENT INFORMATION NEEDS

A review of the many information requirements studies that had been completed in the past several years revealed a wealth of information. Specific information needs identified in these studies were collected and validated by the laboratory working group. This information was categorized by business function and analyzed to determine information class, information type, and priority. The results of this analysis are summarized in Table C-4. It is obvious by reviewing the data in Table C-4 that the vast majority of information requirements involve the financial management and procurement/contracting business functions. It is also apparent from this data that most of the requirements are viewed as operational needs rather than strategic or tactical needs. In general, these needs were identified through various "bottom up" methodologies and represent an excellent integrated summary of the results of recent studies. In the next two appendices, we will focus our attention on a "top-down" approach. By comparing the results from these two methods, we can draw some realistic conclusions concerning the true information needs in a laboratory.

BUSINESS FUNCTION	INFORMATION NEED	INFORMATION CLASS	INFORMATION TYPE	PRIOTIRY
CORPORATE PLANNING	BUSINESS TRENDS	MANAGEMENT	STRATEGIC	HIGH
CORPORATE PLANNING	LONG TERM DEFENSE REQUIREMENTS	TECHNICAL SCIENTIFIC THREAT	STRATEGIC	HIGH
CORPORATE PLANNING	TECHNOLOGY FORECAST DATA	TECHNICAL SCIENTIFIC	STRATEGIC	HIGH
CORPORATE PLANNING	TREND ANALYSIS DATA	GENERAL	STRATEGIC	HIGH
PLANNING	FYDP DATA	PLANS FINANCE	TACTICAL	HIGH
PLANNING	INITIAL REQUIREMENTS DEFINITION	PLANS	TACTICAL	HIGH
PLANNING	REQUIREMENTS DATA (TNs, SONs, ROCs, ETC)	PLANS TECHNICAL SCIENTIFIC	TACTICAL	HIGH
PLANNING	USER REQUIREMENTS TRACKING	ADMINISTRATIVE	OPERATIONAL	HIGH
PLANNING	VANGUARD REQUIREMENTS	PLANS R&D T&E	TACTICAL	HIGH
PROGRAMMING	BUDGET REQUIREMENTS RANKING DATA	PROGRAMS FINANCIAL	TACTICAL	HIGH

TABLE C-4: LABORATORY INFORMATION NEEDS ANALYSIS

BUSINESS FUNCTION	INFORMATION NEED	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
PROGRAMMING	DEFICIENCY REPORTING STATUS	PROGRAMS CONTRACTS	OPERATIONAL	HIGH
PROGRAMMING	MILESTONE/EVENT TRACKING	ADMINISTRATIVE	OPERATIONAL	MEDIUM
PROGRAMMING	PROGRAM BRIEFINGS	ADMINISTRATIVE	OPERATIONAL	HIGH
PROGRAMMING	PROGRAM CONTROL FUNCTIONAL DATA	PROGRAMS	OPERATIONAL	HIGH
PROGRAMMING	PROGRAM DIRECTION	PROGRAMS OPERATIONS	OPERATIONAL	HIGH
PROGRAMMING	PROGRAM DOCUMENTS STATUS	DOCUMENTATION	OPERATIONAL	LOW
PROGRAMMING	PROGRAM MANAGEMENT DIRECTIVE TRACKING	ADMINISTRATIVE	OPERATIONAL	LOW
PROGRAMMING	PROGRAM PERFORMANCE INFORMATION	PROGRAMS CONTRACTS	OPERATIONAL	HIGH
PROGRAMMING	PROGRAM SCHEDULE	PROGRAMS SCHEDULES	OPERATIONAL	MEDIUM
PROGRAMMING	PROGRAM STATUS	PROGRAMS CONTRACTS	OPERATIONAL	MEDIUM
PROGRAMMING	PROJECT SCHEDULING	ADMINISTRATIVE	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	ACCRUED EXPENDITURES BY MOA/JOB ORDER	FINANCE ACCOUNTING	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	AVAILABLE PROGRAM FUNDS	PROGRAMS FINANCE	OPERATIONAL	MEDIUM

TABLE C-4: LABORATORY INFORMATION NEEDS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION NEED	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
FINANCIAL MANAGEMENT	BASELINE DATA	FINANCE	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	BUDGET REPROGRAMMING DATA	BUDGET	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	COST BASELINE MONITORING	FINANCE	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	COST ESTIMATING DATA	FINANCE	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	CUMULATIVE EXPENDITURES BY MOA AND JOB ORDER	FINANCE ACCOUNTING	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	CUMULATIVE EXPENDITURES BY CATEGORY OF EXPENSE	FINANCE ACCOUNTING	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	CURRENT AND OUTYEAR PROJECT FUNDS FOR 6.1 AND ARPA FOR THRUST, PROJECT, AND ORGANIZATION	BUDGET	TACTICAL	MEDIUM
FINANCIAL MANAGEMENT	CURRENT CONTRACT FUND INFORMATION	FINANCE CONTRACTS	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	CURRENT ESTIMATE OF COST AND SCHEDULE TO COMPLETION	FINANCE SCHEDULES	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	CURRENT YEAR RDT&E FUNDS	FINANCE BUDGET	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	FINANCIAL HISTORY	FINANCE	OPERATIONAL	LOW

TABLE C-4: LABORATORY INFORMATION NEEDS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION NEED	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
FINANCIAL MANAGEMENT	FINANCIAL OVERRUN BY JOB ORDER	FINANCE CONTRACTS	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	FUNDING PROFILE FOR FYDP YEARS	FINANCE BUDGET	TACTICAL	MEDIUM
FINANCIAL MANAGEMENT	FUND SOURCE SUMMARY BY PEC, PROJECT, TASK, JOB ORDER, AND PR	FINANCE ACCOUNTING	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	HISTORICAL DATA ON FUND EXPENDITURES	FINANCE ACCOUNTING	OPERATIONAL	LOW
FINANCIAL MANAGEMENT	INCREMENTAL FUNDING REQUIREMENTS DATA	FINANCE ACCOUNTING	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	INITIATION/OBLIGATION/ EXPENDITURE TRACKING	FINANCE ACCOUNTING	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	INITIATION/OBLIGATION FORECASTING	FINANCE BUDGET	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	INITIATION/OBLIGATION RECONCILIATION	FINANCE ACCOUNTING	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	MANPOWER RESOURCES AND REIMBURSEMENT	FINANCE RESOURCES	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	OBLIGATIONS AND EXPENDITURES DEVIATION REPORTING	FINANCE ACCOUNTING	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	PROGRAM BUDGET DATA	BUDGET	OPERATIONAL	HIGH

TABLE C-4: LABORATORY INFORMATION NEEDS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION NEED	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
FINANCIAL MANAGEMENT	PROGRAM FINANCIAL STATUS	FINANCE	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	PROJECTED CUSTOMER REIMBURSEMENTS	FINANCE BUDGET	OPERATIONAL	HIGH
FINANCIAL MANAGEMENT	PROJECTED FUNDS EXPENDED BY END OF FY AS A FUNCTION OF PR STATUS	FINANCE ACCOUNTING	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	PROJECTED LEVEL OF AVAILABLE FUNDS BY PEC, PROJECT, THRUST	FINANCE BUDGET	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	SMALL BUSINESS OBLIGATIONS	FINANCE CONTRACTS	OPERATIONAL	LOW
FINANCIAL MANAGEMENT	STATUS OF MIPRs	FINANCE ACCOUNTING	OPERATIONAL	MEDIUM
FINANCIAL MANAGEMENT	TOTAL PLANNED EXPENDITURES BY JOB ORDER	FINANCE BUDGET	OPERATIONAL	MEDIUM
MANPOWER/ PERSONNEL	GRADE AND SKILL LEVEL OF CURRENT MANPOWER	MANPOWER PERSONNEL	OPERATIONAL	MEDIUM
MANPOWER/ PERSONNEL	MANPOWER AND PERSONNEL STATUS	MANPOWER PERSONNEL	OPERATIONAL	MEDIUM
MANPOWER/ PERSONNEL	MANPOWER PLANNING DATA	MANPOWER PERSONNEL	TACTICAL	MEDIUM
MANPOWER/ PERSONNEL	TRAINING REQUIREMENTS	TRAINING	OPERATIONAL	MEDIUM

TABLE C-4: LABORATORY INFORMATION NEEDS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION NEED	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
MANPOWER/ PERSONNEL	VACANCIES, OVERAGES, HIRING STATUS	MANPOWER PERSONNEL	OPERATIONAL	HIGH
RESEARCH & DEVELOPMENT TEST & EVALUATION	ENVIRONMENTAL CONSIDERATIONS	ENVIRONMENTAL	OPERATIONAL	MEDIUM
RESEARCH & DEVELOPMENT TEST & EVALUATION	CONFIGURATION MANAGEMENT DATA	LOGISTICS TESTING	OPERATIONAL	MEDIUM
RESEARCH & DEVELOPMENT TEST & EVALUATION	IR&D STATUS	PROGRAMS TECHNICAL	OPERATIONAL	MEDIUM
RESEARCH & DEVELOPMENT TEST & EVALUATION	LOGISTICAL SUPPORT REQUIREMENTS	LOGISTICS TECHNICAL	TACTICAL	MEDIUM
RESEARCH & DEVELOPMENT TEST & EVALUATION	LOGISTICS ENGINEERING STRATEGY	LOGISTICS TECHNICAL	TACTICAL	MEDIUM
TEST & EVALUATION	AVAILABLE EQUIPMENT LISTS	TESTING INVENTORY	OPERATIONAL	MEDIUM
TEST & EVALUATION	FACILITY CAPABILITY DATA	TESTING TECHNICAL	OPERATIONAL	MEDIUM

TABLE C-4: LABORATORY INFORMATION NEEDS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION NEED	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
TEST & EVALUATION	TEST DOCUMENTATION	TESTING TECHNICAL	OPERATIONAL	MEDIUM
FACILITIES	HOURS AND COST OF FACILITY UTILIZATION	OPERATIONS	OPERATIONAL	MEDIUM
FACILITIES	TESTING STATUS	TESTING	OPERATIONAL	MEDIUM
FACILITIES	TEST SCHEDULES	SCHEDULES TESTING OPERATIONS	OPERATIONAL	HIGH
FACILITIES	TEST SUPPORT REQUIREMENTS	TESTING OPERATIONS	OPERATIONAL	HIGH
FACILITIES	USER TEST REQUIREMENTS	PLANS TESTING	TACTICAL	HIGH
PROCUREMENT/ CONTRACTING	ACTIVE CONTRACTS LIST	CONTRACTS	OPERATIONAL	MEDIUM
PROCUREMENT/ CONTRACTING	CONTRACT AWARD ACTIVITY	PROCUREMENT	OPERATIONAL	MEDIUM
PROCUREMENT/ CONTRACTING	CONTRACT CHANGE STATUS	CONTRACTS	OPERATIONAL	MEDIUM
PROCUREMENT/ CONTRACTING	CONTRACT DATA REQUIREMENTS	PROCUREMENT CONTRACTS	OPERATIONAL	HIGH
PROCUREMENT/ CONTRACTING	CONTRACT FUNDS STATUS	CONTRACTS	OPERATIONAL	MEDIUM

TABLE C-4: LABORATORY INFORMATION NEEDS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION NEED	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
PROCUREMENT/ CONTRACTING	CONTRACTING STRATEGY	PROCUREMENT	OPERATIONAL	MEDIUM
PROCUREMENT/ CONTRACTING	CONTRACTOR CORRESPONDENCE	ADMINISTRATIVE CONTRACTS	OPERATIONAL	HIGH
PROCUREMENT/ CONTRACTING	CONTRACTOR PERFORMANCE	CONTRACTS	OPERATIONAL	HIGH
PROCUREMENT/ CONTRACTING	CONTRACTOR SAFETY COMPLIANCE REPORTING	SAFETY	OPERATIONAL	MEDIUM
PROCUREMENT/ CONTRACTING	CONTRACTOR SURVEILLANCE DATA	CONTRACTS	OPERATIONAL	HIGH
PROCUREMENT/ CONTRACTING	CONTRACTOR TESTING STATUS	TESTING CONTRACTS	OPERATIONAL	HIGH
PROCUREMENT/ CONTRACTING	CONTRACT SCHEDULING	SCHEDULES CONTRACTS	OPERATIONAL	MEDIUM
PROCUREMENT/ CONTRACTING	CONTRACT SCHEDULE TRACKING	SCHEDULES CONTRACTS	OPERATIONAL	HIGH
PROCUREMENT/ CONTRACTING	CONTRACT SECURITY CLASSIFICATION SPECIFICATION	SECURITY CONTRACTS	OPERATIONAL	MEDIUM
PROCUREMENT/ CONTRACTING	CONTRACTS WITH DELINQUENT DELIVERABLES	CONTRACTS	OPERATIONAL	HIGH
PROCUREMENT/ CONTRACTING	CONTRACT TRACKING	ADMINISTRATIVE CONTRACTS	OPERATIONAL	MEDIUM

TABLE C-4: LABORATORY INFORMATION NEEDS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION NEED	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
PROCUREMENT/ CONTRACTING	LISTING OF COMPETITIVE AND SOLE SOURCE PROCUREMENT	PROCUREMENT	OPERATIONAL	LOW
PROCUREMENT/ CONTRACTING	LISTING OF PR PACKAGES BEHIND SCHEDULE	PROCUREMENT SCHEDULES	OPERATIONAL	HIGH
PROCUREMENT/ CONTRACTING	LIST OF PRs BY VENDOR TYPE	PROCUREMENT	OPERATIONAL	LOW
PROCUREMENT/ CONTRACTING	NARRATIVE DESCRIPTIONS OF CURRENT CONTRACTS	CONTRACTS	OPERATIONAL	MEDIUM
PROCUREMENT/ CONTRACTING	PROGRESS OF ACQUISITIONS BY PR AND BUYER	PROCUREMENT	OPERATIONAL	MEDIUM
PROCUREMENT/ CONTRACTING	RETIRED CONTRACTS LIST	CONTRACTS	OPERATIONAL	LOW
PROCUREMENT/ CONTRACTING	RFP PREPARATION STATUS	PROCUREMENT	OPERATIONAL	MEDIUM
PROCUREMENT/ CONTRACTING	STATUS OF CLAIMS, DISPUTES, PROTESTS	PROCUREMENT CONTRACTS	OPERATIONAL	HIGH
PROCUREMENT/ CONTRACTING	STATUS OF DETERMINATION & FINDINGS	PROCUREMENT	OPERATIONAL	HIGH
PROCUREMENT/ CONTRACTING	STATUS ON SOURCE SELECTIONS	PROCUREMENT	OPERATIONAL	HIGH
PROCUREMENT/ CONTRACTING	SUMMARY OF COMMITTED AND OBLIGATED PROJECTS BY SOURCE OF FUNDS	PROCUREMENT CONTRACTS	OPERATIONAL	MEDIUM

TABLE C-4: LABORATORY INFORMATION NEEDS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION NEED	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
PROCUREMENT/ CONTRACTING	SUMMARY CONTRACT FUND INFORMATION	CONTRACTS	OPERATIONAL	LOW
OPERATIONS & LOGISTICS	MANPOWER EXPENDITURES	RESOURCES ACCOUNTING	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	MANPOWER RESOURCES	RESOURCES	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	MANPOWER UTILIZATION BY CATEGORY	RESOURCES ACCOUNTING	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	SAFETY CONSIDERATIONS	SAFETY	OPERATIONAL	HIGH
OPERATIONS & LOGISTICS	SPECIAL COMMUNICATIONS REQUIREMENTS	COMMUNICATIONS OPERATIONS	OPERATIONAL	HIGH
OPERATIONS & LOGISTICS	STATUS OF ACQUISITIONS OF SUPPLIES AND EQUIPMENT	SUPPLY	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	SUMMARY OF PROJECTED MANPOWER BY BUDGET SOURCES, WORK FORCE CATEGORIES, AND INDIVIDUAL WORK UNITS	RESOURCES ACCOUNTING	OPERATIONAL	MEDIUM
OPERATIONS & LOGISTICS	TECHNICAL ORDER STATUS	DOCUMENTATION	OPERATIONAL	LOW
ADMINISTRATION	ACTION ITEM TRACKING	ADMINISTRATIVE	OPERATIONAL	MEDIUM
ADMINISTRATION	BASE LOCATOR DATA	ADMINISTRATIVE PERSONNEL	OPERATIONAL	LOW

TABLE C-4: LABORATORY INFORMATION NEEDS ANALYSIS (CONTINUED)

BUSINESS FUNCTION	INFORMATION NEED	INFORMATION CLASS	INFORMATION TYPE	PRIORITY
ADMINISTRATION	DOCUMENTATION REQUIREMENTS	DOCUMENTATION	OPERATIONAL	MEDIUM
ADMINISTRATION	LABORATORY ACTIVITY SCHEDULE	ADMINISTRATIVE	OPERATIONAL	MEDIUM
ADMINISTRATION	MEETINGS AND KEY PERSONNEL SCHEDULING	ADMINISTRATIVE	OPERATIONAL	LOW
ADMINISTRATION	OFFICE OF PRIMARY RESPONSIBILITY	ADMINISTRATIVE	OPERATIONAL	LOW
ADMINISTRATION	SCHEDULING OF BRIEFINGS	SCHEDULES ADMINISTRATIVE	OPERATIONAL	LOW
ADMINISTRATION	SUSPENSES	ADMINISTRATIVE	OPERATIONAL	HIGH
ADMINISTRATION	VISITOR CONTROL SYSTEM DATA	SECURITY ADMINISTRATIVE	OPERATIONAL	MEDIUM
ADMINISTRATION	VISITOR SCHEDULE	SECURITY ADMINISTRATIVE	OPERATIONAL	LOW
INFO RESOURCE MANAGEMENT	DATA DICTIONARY/DIRECTORY	ADMINISTRATIVE	OPERATIONAL	HIGH
INFO RESOURCE MANAGEMENT	MIS INVENTORY	INVENTORY ADMINISTRATIVE	OPERATIONAL	LOW
INFO RESOURCE MANAGEMENT	REQUIREMENTS DATA	PLANNING	TACTICAL	HIGH

TABLE C-4: LABORATORY INFORMATION NEEDS ANALYSIS (CONTINUED)

APPENDIX D

CRITICAL SUCCESS FACTORS

D. CRITICAL SUCCESS FACTORS

1. THE CRITICAL SUCCESS FACTOR METHOD

An overview of the Critical Success Factor (CSF) method was presented in Appendix A. The CSF method, as defined by the Alfred P. Sloan School of Management, Massachusettes Institute of Technology, is a formalized approach used in gathering and analyzing user information needs. This method focuses on individual users and on identifying each user's current information needs. The methodology takes into consideration the fact that information needs will vary from user to user and that these needs will change with time for a particular user.

Figure D-1 represents a conceptual model of the CSF method based on a simplified interpretation of the basic concept. The real information needs of the decision maker can be identified by generating, quantifying, and measuring the critical factors which enhance or impede successful attainment of the decision maker's goals. Since specific CSFs will invariably change with time, an organization using the CSF method must be prepared to periodically reassess organizational CSFs to ensure that they are current. Structured and unstructured interviews are used to gather data to determine critical success factors. The following sample questions can be used during the interview process:

a. Have you established specific measurable goals for your activity? What are they?

b. In what terms do you evaluate the success of your activities? How do you know when a goal has been achieved?

c. Are there specific measurements that characterize the degree of success?

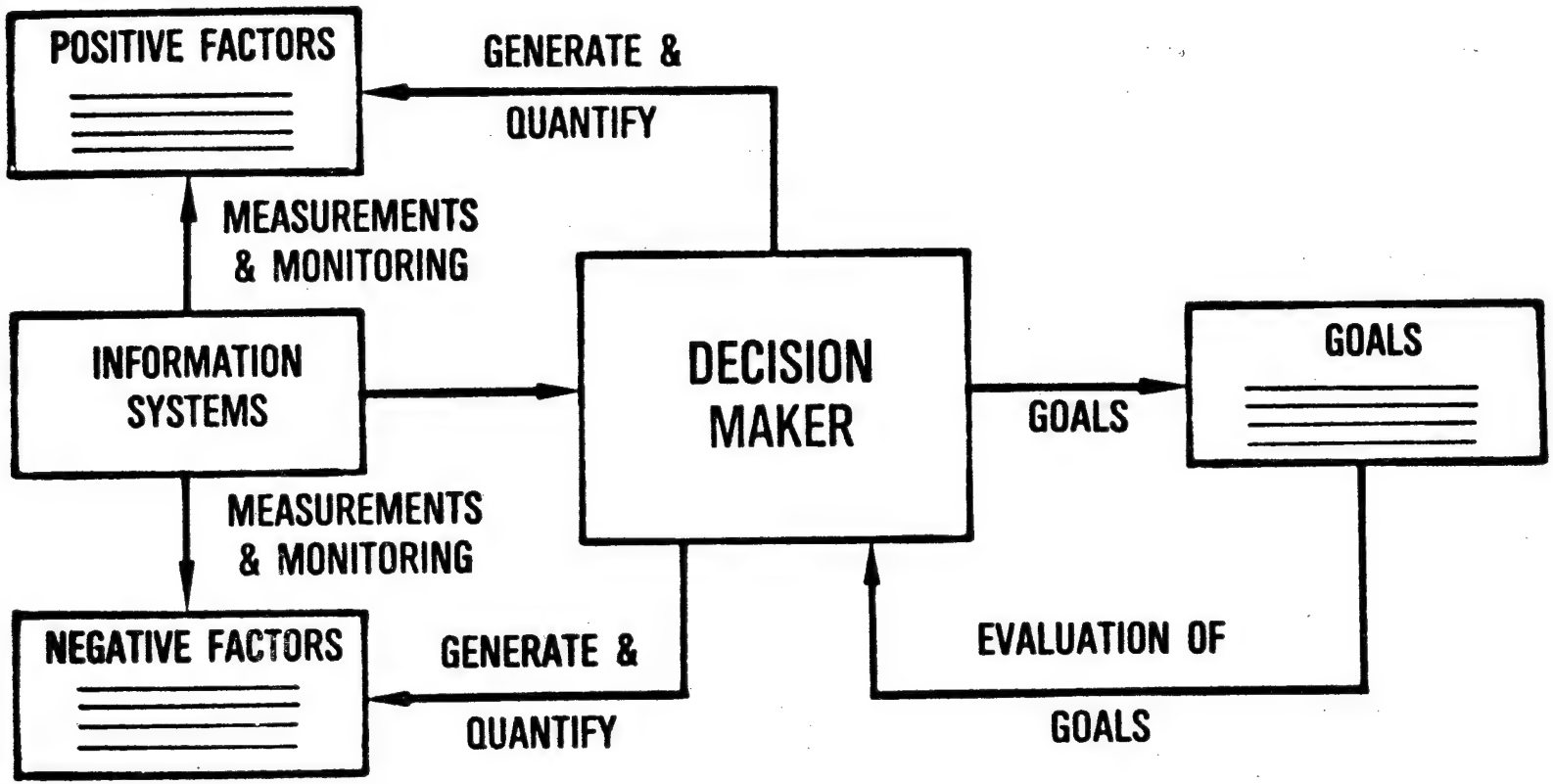

FIGURE D-1: CRITICAL SUCCESS FACTOR MODEL

d. What factors have major impact on your success?

e. Are there measures which determine the significance of these impacting factors?

Based on the answers to these questions and a review of the mission and structure of the organization under study, an analyst, experienced in the application of the CSF method, can aid the organization in developing a small number of highly relevant critical success factors. Once these factors have been determined, the organization must identify indices related to these factors that can be measured and tracked. These measurable indices form the basis for a decision oriented information system that focuses on the organization's critical success factors. Such a system is not intended to supply all of the information needed to operate an organization. It is intended to focus management attention on those factors that can significantly impact the success of the organization.

2. LABORATORY APPLICATION OF THE CSF METHOD

In 1978, two Massachusetts Institute of Technology students conducted a study of critical success factors for government research and development centers. As a result of the study they identified a number of critical success factors related to six key organizational goals. The six key goals are as follows: The organization should have

a. a clear purpose and direction,

b. sufficient resources and a high degree of productivity,

c. a valued and highly effective product,

d. effective control and accountability,

e. organizational unity, and

f. a good program for human resource development.

PURPOSE AND DIRECTION

- Mission and Role
- Liaison and Recognition
- Objectives Goals and Plans
- Program Selection and Diversification

RESOURCES AND PRODUCTIVITY

- Budget Justification
- Resource Appropriations
- Resource Utilization Efficiency
- Productivity

PRODUCT EFFECTIVENESS AND VALUE

- Product Responsiveness
- Product Utility and Applications
- Technical Quality and Excellence
- Product Dissemination and Reputation

CONTROL AND ACCOUNTABILITY

- Project Management and Control
- Management Responsibility
- Communications and Commitment
- Personnel Evaluations

ORGANIZATIONAL UNITY

- Authority Relations
- Team Cohesiveness
- Health and Morale
- Safety

HUMAN RESOURCE DEVELOPMENT

- Staff Competence
- Skill Needs Planning
- Recruitment
- Individual Career Planning

TABLE D-1: KEY GOALS AND CRITICAL SUCCESS FACTORS FOR GOVERNMENT R&D ORGANIZATIONS

The critical success factors related to these goals are listed in Table D-1. These factors are fairly representative of the ones you would expect from a typical AFSC research and development organization.

The next stage in the process involves a determination of critical success factors for each major activity in an organization. Several different views have developed as a result of numerous applications of the CSF methodology. Some believe that the success factors at command level should be expressed in the fewest number of statements of any of the groups. At each successive lower level, the success factors would include those of the higher level and would contain additional factors. This stems from the fact that each level should be, at a minimum, interested in the factors associated with the next higher level in the organization.

Another view is that the critical success factors are highly dependent on the maturity and stability of the organization under study as well as the overall management environment. In organizations emphasizing participative management, there is a general understanding of CSFs at each level of the organization. This allows each level to concentrate on those CSFs that maximize attainment of their unique goals. Through participative management, these unique goals integrate together to support overall corporate goals. In this view, the goals of the lower levels do not necessarily duplicate the goals of the higher levels.

In order to complete the application of the CSF method to a laboratory environment, we begin with our representative laboratory organization shown in Figure 5 of Section II of this report. In looking at the chain of command between the laboratory command level and the line project engineer, we will apply the first view previously described.

a. Command Level

(1) Relevant technical mission

(2) Funds, facilities, and manpower

(3) Feedback from higher headquarters

(4) Technology transfer/accomplishments

(5) Minimum effort reporting system

b. RDT&E Division Level

(1) Relevant technical mission

(2) Funds, facilities, and manpower

(3) Feedback from higher levels of management

(4) Technology transfer/accomplishments

(5) Minimum effort reporting system

(6) Adequate supporting staff (e.g., secretarial, technicians, etc.)

c. RDT&E Branch Level

(1) Relevant technical mission

(2) Funds, facilities, and manpower

(3) Feedback from higher levels of management

(4) Technology transfer/accomplishments

(5) Minimum effort reporting system

(6) Adequate supporting staff

(7) Effective position management

d. RDT&E Group Level

(1) Relevant technical mission area

(2) Funds, facilities, and manpower

(3) Feedback from higher levels of management

(4) Technology transfer/accomplishments

(5) Minimum effort reporting system

(6) Adequate supporting staff

(7) Input to position management plan

(8) Individual career planning

e. Project Engineer

(1) Relevant technical mission area

(2) Identifiable problems to be solved

(3) Supporting intelligence data

(4) Funds, facilities, manpower to accomplish the task

(5) Adequate supporting staff

(6) Timely contracting

(7) Access to tools necessary to accomplish assigned tasks (e.g., computers, test facilities, test ranges, etc.)

(8) Opportunity for training, career planning, etc.

(9) Adequate work space and conditions

(10) Feedback from management

(11) Opportunity to present results (e.g., papers, presentations, TRs)

(12) Technology transfer

(13) Minimum effort reporting system

The second view emphasized the establishment of unique critical success factors for various organizations in a laboratory. For simplicity we will apply this view only to the plans and programs staff office, the management services division level, and the technical services division level.

a. Plans and Programs Staff Office

(1) Thorough understanding of external requirements and needs

(2) Effective communication with line S&E personnel and higher level management

(3) Technical credibility with laboratory and headquarters management

(4) Technically competent staff

(5) Effective planning support systems

(6) Effective program status support systems

b. Management Services Division

(1) Thorough understanding of customer needs

(2) Service oriented mentality throughout division

(3) Funds, facilities, and manpower to provide responsive services

(4) Technical expertise in assigned areas

(5) Ability to implement policies/procedures with minimum burden

c. Technical Services Division

(1) Thorough understanding of customer needs

(2) Service oriented mentality throughout division

(3) Funds, facilities, and manpower to support valid needs

(4) Effective interface with base/outside organization support services

(5) Technical expertise in assigned areas

(6) Effective resource management, operation, and control process

(7) Responsive services in assigned areas

When applied properly, the use of critical success factors in an organization can accomplish the following:

a. Focus management's attention,

b. Provide measures of performance,

c. Insure that critical areas receive timely management attention,

d. Facilitate planning and control processes,

e. Define both important and unimportant information, and

f. Move the organization away from unnecessary reporting and data collection. The methodology has the potential to identify an optimum paperwork level.

The next step in the CSF method involves the development of measurable indices to track critical success factors. This problem is addressed in Appendix E.

APPENDIX E

MANAGEMENT INDICES

E. MANAGEMENT INDICES

In our discussion of critical success factors, we found that first it was necessary to define the goals of the organization. Once those goals were determined, then we had to identify key factors that contributed to successful achievement of those goals. In our analysis, we adopted the six major goal areas identified by MIT as representative of the AFSC laboratory environment. We then identified general success factors associated with those goals and specific success factors related to our representative laboratory organization. The next step in the process is to identify management indices, related to the goal areas, that can be used to track the performance of critical success factors. A general approach to measurement indices was included in Section IV of this report. It is beyond the scope of this effort to specifically identify all possible management indices applicable to the laboratories. However, the Executive Development Group of the Aero Propulsion Laboratory conducted an in-house study to identify a set of indices that could be used by management to measure success. This study was augmented with information from the Air Force Armament Laboratory. The laboratories identified 43 management indicators with associated measurement indices. Table E-1 provides definitions for the indicators, lists the measurement indices, and relates the process back to the major business functions for a typical laboratory. These indicators are related to the six major goal areas in Table E-2.

From the Headquarters perspective, it is important that any indicators used at the laboratory level be precisely defined and that the definitions be standardized throughout. For example, terms like S&E, technician, overhead must be defined in a standard way if data from different

BUSINESS FUNCTION	MANAGEMENT INDICATOR	INDICATOR DEFINITION/MEASUREMENT INDICES
CORPORATE PLANNING	CHANGE FACTORS	The frequency of occurrence of a significant (25%) change in an important laboratory parameter. - Time since last major reorganization - Time since the inflation corrected budget increased by 25% - Time since the last major facility modification
CORPORATE PLANNING	GROWTH RATE	Rate of laboratory resource growth per year. - Increase or decrease in lab manpower per year - Increase or decrease in lab contracts per year
CORPORATE PLANNING	INTERNATIONAL TECHNICAL COMPARISONS	Assessment of the laboratory capability as compared to other organizations responsible for similar technology. - Number/% of personnel recognized as international experts
CORPORATE PLANNING	ORGANIZATION HEALTH	Laboratory personnel attitude/vitality characteristics. - Sick leave/person/year - Voluntary overtime/person - Number of complaints - Lab function attendance - Safety record - Number of EEO actions - Number of GS-12s leaving - Percent of GS-12s with more than 5 years experience in the laboratory - Grade distribution - Rank distribution

TABLE E-1: REPRESENTATIVE MANAGEMENT INDICATORS AND MEASUREMENT INDICES

BUSINESS FUNCTION	MANAGEMENT INDICATOR	INDICATOR DEFINITION/MEASUREMENT INDICES
CORPORATE PLANNING	OUTSIDE APPROVAL	Positive recognition of the laboratory by higher headquarters or outside organizations. - Letters of appreciation - Awards (organization & personnel) - Washington recognition
CORPORATE PLANNING	TECHNICAL "ACCLAIM/ VISIBILITY"	Recognition by higher headquarters/industry/other government agencies of technical achievement by the laboratory. - Number of awards/patents - Number of presentations to technical societies - Number of technical reports - Number of published journal articles
PLANNING	INVESTMENT STRATEGY RATING	The rating of the importance and applicability of lab technology efforts to future systems needs. - "Investment Assessment" rating - User assessment rating
PLANNING	PROGRAM TECHNICAL MARKETING SCOPE	Effort expended to obtain dollars, manpower, facility support for lab technology efforts. - Number of trips/year expended - Manpower/year expended - Number of Unsolicited Proposals received and accepted - Amount of income from reimbursements
PLANNING	RELEVANCY	The rating of the importance and applicability of lab technology efforts to future system needs. - "Investment Assessment" rating - User assessment rating - Program ranking

TABLE E-1: REPRESENTATIVE MANAGEMENT INDICATORS AND MEASUREMENT INDICES (CONTINUED)

BUSINESS FUNCTION	MANAGEMENT INDICATOR	INDICATOR DEFINITION/MEASUREMENT INDICES
PROGRAMMING	COMPARATIVE HEADQUARTERS RANKING	Measure of the importance of the laboratory programs relative to others within higher headquarters. - Headquarters ranking of lab programs - Lab goals/priorities
PROGRAMMING	POLITICAL APPROVAL/ REJECTIONS	Reaction by higher headquarters, industry or other government agency tc a technical proposal/concept advocated by the laboratory. - Number of technical proposals/concepts accepted or rejected/year by outside organizations
PROGRAMMING	PROJECTS INITIATED	Number of projects defined and funded by lab resources. - Number of projects funded/year - Average funds per project
PROGRAMMING	PROJECTS PENDING	Number of projects defined to meet lab mission but for which resources are not available. - Number of projects overceiling/year - Number of projects proposed/year - Overceiling funding levels
PROGRAMMING	PROJECTS REJECTED	Planned or proposed programs, which for either technical or financial reasons, are not initiated. - Number of "below the line" programs on initial priority list for funds - Number of programs on division wish lists - Number of major thrusts not attempted

TABLE E-1: REPRESENTATIVE MANAGEMENT INDICATORS AND MEASUREMENT INDICES (CONTINUED)

BUSINESS FUNCTION	MANAGEMENT INDICATOR	INDICATOR DEFINITION/MEASUREMENT INDICES
PROGRAMMING	PROJECTS TERMINATED	The amount of in-house and contractual activity terminated by the laboratory prior to the achievement of the program goals. - Number of in-house work units terminated - Number of contractual efforts terminated (officially) - Number of major changes to contractual S.O.W.s
FINANCIAL MANAGEMENT	BUDGET BALANCING	Funds on any contractual document not committed and obligated during the specified fiscal year. - Number of ULOs - Dollars unliquidated
FINANCIAL MANAGEMENT	BUDGET REQUEST SCORE	Lab's batting average with respect to requests for funds. - Budget received vs requested - Advanced development programs initiated - Number of major requests attempted
FINANCIAL MANAGEMENT	FINANCIAL TRACKING	A measure of how closely the laboratory tracks its financial business. - Number of initial buyplan changes/year - Dollar level of decisions vs management level - Number of cost overruns/year
FINANCIAL MANAGEMENT	FUNDING SUPPORT	Dollars provided laboratory to accomplish its mission. - Dollar/funding source (6.1, 6.2, 6.3) - Dollar/outside agency
FINANCIAL MANAGEMENT	INITIATED COMMITTED	The procurement position of the work units and programs of the laboratory. - Programs initiated vs time - Programs committed vs time - Programs obligated vs time - Ratios of the above and with time and dollars

TABLE E-1: REPRESENTATIVE MANAGEMENT INDICATORS AND MEASUREMENT INDICES (CONTINUED)

BUSINESS FUNCTION	MANAGEMENT INDICATOR	INDICATOR DEFINITION/MEASUREMENT INDICES
FINANCIAL MANAGEMENT	LAB FINANCIAL LOADING	Lab portion of DL and AF R&D budget. - Percent DL budget - Percent AFSC budget - Percent USAF budget
FINANCIAL MANAGEMENT	RESOURCE REQUEST ACCOMPLISHMENT RATING	Level of original budget resource request received by lab to accomplish mission. - Percent of requested budget dollars received - Percent of manpower request received
FINANCIAL MANAGEMENT	RETURN ON INVESTMENT	In the government sector usually called benefit-to-cost (BC ratio). BC ratio reflects the users net benefits for a new technology divided by the sponsoring organization's cost to develop that technology. - Reduction in System Life Cycle Cost divided by development cost - Increase in Performance/Life/or survivability system characteristics divided by development cost - Increase in kill probability (P_k) - Cost per kill - Kills per sortie - Catastrophe avoidance - Cost reduction
MANPOWER/ PERSONNEL	AVERAGE GRADE LEVEL	A measure of the grade level, its rate of change, and its relationship to laboratory needs. - Average grade level, actual - Average grade level, past - Average grade level, desired

TABLE E-1: REPRESENTATIVE MANAGEMENT INDICATORS AND MEASUREMENT INDICES (CONTINUED)

BUSINESS FUNCTION	MANAGEMENT INDICATOR	INDICATOR DEFINITION/MEASUREMENT INDICES
MANPOWER/ PERSONNEL	ORGANIZATION LOADING	Number of personnel (or fraction of the laboratory) devoted to various lab functions. - Number of managers vs engineers - Number of military vs civilian - Number of secretaries vs engineers - Number of technicians vs engineers - Number of supply personnel vs technicians
MANPOWER/ PERSONNEL	ORGANIZATIONAL MANPOWER	Lab rating manpower characteristics. - Average age/S&E - Average age/technician - Average age/Admin - Grade/rank distribution - Experience levels - Degree distribution (PhD, Masters, Bachelor) - Number of S&Es
MANPOWER/ PERSONNEL	PERSONNEL TURNOVER	The change in the personnel level or structure over a period of time, e.g., one year. - Number of people leaving lab - Number of people entering lab - Average grade level - Total military/civilian personnel - Number leaving for industry - Number leaving for other government agencies
RESEARCH & DEVELOPMENT TEST & EVALUATION	COMPLETION RECORD	The ability of the laboratory to successfully complete major programs and achieve the program goals. - Number of planned significant accomplishments achieved - Number of major thrusts completed - Number of changes in lab planning goals due to successes

TABLE E-1: REPRESENTATIVE MANAGEMENT INDICATORS AND MEASUREMENT INDICES (CONTINUED)

BUSINESS FUNCTION	MANAGEMENT INDICATOR	INDICATOR DEFINITION/MEASUREMENT INDICES
RESEARCH & DEVELOPMENT TEST & EVALUATION	FULFILLING SUPPORT REQUESTS	The laboratory's willingness and ability to fulfill requests for technical support from outside activities. - Number of requests supported each year - Fraction of requests ignored or only marginally supported
RESEARCH & DEVELOPMENT TEST & EVALUATION	INTERAGENCY/INTERGOVERNMENT COORD PROGRAMS	Programs which are coordinated through formal agreements or meetings or by informal engineer to engineer communications. - Number of jointly funded programs - Number of MOU or interagency agreements
RESEARCH & DEVELOPMENT TEST & EVALUATION	LABORATORY LOADING	Comparison of in-house to out-house to system support effort levels. - In-house/out-house manyear ratio - In-house/system support manyear ratio - Out-house/system support manyear ratio - Percent of manpower for in-house - Percent of manpower for non in-house - Percent of manpower for support - Dollars in-house - Dollars non in-house - Dollars support
RESEARCH & DEVELOPMENT TEST & EVALUATION	POSITIVE/NEGATIVE FEEDBACK	Critique of laboratory programs and/or technical capability from within or external to the laboratory. - Number of positive/negative critiques

TABLE E-1: REPRESENTATIVE MANAGEMENT INDICATORS AND MEASUREMENT INDICES (CONTINUED)

BUSINESS FUNCTION	MANAGEMENT INDICATOR	INDICATOR DEFINITION/MEASUREMENT INDICES
RESEARCH & DEVELOPMENT TEST & EVALUATION	PROJECT ORIENTATION	Number of technical programs being conducted by the laboratory oriented towards expanding technical knowledge compared to the number which we directed towards advancing technology applicable to a specific weapon system. - Number of tech base programs - Number of system-oriented programs - Ratio of above
RESEARCH & DEVELOPMENT TEST & EVALUATION	PROJECTS COMPLETED	Technology programs which were conducted through to the planned conclusion. - Number of projects completed/year
RESEARCH & DEVELOPMENT TEST & EVALUATION	REQUEST FOR SUPPORT	Outside government organization requests for lab technology development effort. - Number of requests - Funds provided/year - Percent of manpower used for outside support - Number of different agencies supported - Number of joint programs
RESEARCH & DEVELOPMENT TEST & EVALUATION	TECHNICAL GOAL ACHIEVEMENT	Achievement of planned technical goals (within time and resource constraints). - Number of technical underruns per year - Number of cost overruns per year - Number of planned significant accomplishments achieved (this area must be developed)
RESEARCH & DEVELOPMENT TEST & EVALUATION	TECHNOLOGY TRANSFERRED	Technology developed by the laboratory which is being utilized in a weapon system. - Number of system applications

TABLE E-1: REPRESENTATIVE MANAGEMENT INDICATORS AND MEASUREMENT INDICES (CONTINUED)

BUSINESS FUNCTION	MANAGEMENT INDICATOR	INDICATOR DEFINITION/MEASUREMENT INDICES
FACILITIES	CAPITAL EXPENDITURE	Funds expended on maintaining and upgrading lab facilities (buildings, equipment). - Maintenance dollars/year - Dollars for new facilities/year
FACILITIES	FACILITY UTILIZATION	Facility usage in direct RDT&E work. - Number of active test projects in laboratory facilities - Number of completed test projects in laboratory facilities - Manhours charged to direct RDT&E work in laboratory facilities
PROCUREMENT/ CONTRACTING	PROCUREMENT SUPPORT	Level of service provided by procurement and contracting support organizations - Time from PR initiation to contract - Number of contracts initiated per year
OPERATIONS & LOGISTICS	OVERHEAD	The number of people in the laboratory involved in supporting the line division personnel, usually discussed as a ratio or percentage. - Number of people on staff vs line - Managers and staff vs line S&Es - Technicians vs in-house engineers - Admin and technicians vs engineers - Percent of overhead
OPERATIONS & LOGISTICS	WORK UNIT LOADING	Completion of lab manpower support per work unit. - Manyears/work unit - Lab expense/work unit
OPERATIONS & LOGISTICS	SUPPLY SUPPORT	Level of service provided by supply organizations. - Average time to fill a supply request - Number of supply requests filled per year

TABLE E-1: REPRESENTATIVE MANAGEMENT INDICATORS AND MEASUREMENT INDICES (CONTINUED)

BUSINESS FUNCTION	MANAGEMENT INDICATOR	INDICATOR DEFINITION/MEASUREMENT INDICES
ADMINISTRATION	FULFILLMENT OF EXTERNAL DEMANDS	Satisfactory response to a request for information from an outside organization. - Number of responses given to outside organizations
ADMINISTRATION	PUBLICITY	Any information disseminated concerning laboratory achievements, actions, or personnel. - Number of news releases - Number of awards received/given
ADMINISTRATION	TRAVEL	The amount of laboratory resources devoted to interacting with the outside world, on their territory. - Number of trips/year - Travel budget vs lab budgets - Average length of trips - Average number of travelers per trip
INFO RESOURCE MANAGEMENT	PAPERWORK REDUCTION	Reduction in paperwork resulting from IRM implementation. - Percent reduction in overhead hours per year

TABLE E-1: REPRESENTATIVE MANAGEMENT INDICATORS AND MEASUREMENT INDICES (CONTINUED)

PURPOSE AND DIRECTION

- Change Factors
- Growth Rate
- Investment Strategy Rating
- Lab Financial Loading
- Publicity
- Technical "Acclaim/Visibility"
- Travel

RESOURCES AND PRODUCTIVITY

- Budget Balancing
- Budget Request Score
- Capital Expenditure
- Funding Support
- Laboratory Loading
- Organizational Loading
- Overhead
- Program Technical Marketing Scope
- Projects Pending
- Work Unit Loading

PRODUCT EFFECTIVENESS AND VALUE

- Comparative Headquarters Ranking
- Fulfilling Support Requests
- Interagency/Intergovernment Programs
- International Technical Comparisons
- Political Approval/Rejections
- Project Orientation
- Projects Rejected
- Projects Terminated
- Relevancy
- Request for Support
- Return on Investment
- Technical Goal Achievement
- Technology Transferred

CONTROL AND ACCOUNTABILITY

- Completion Record
- Financial Tracking
- Fulfillment of External Demands
- ICO Status
- Positive/Negative Feedback
- Projects Completed
- Projects Initiated
- Resource Request Accomplishment Rating

ORGANIZATIONAL UNITY

- Organization Health
- Outside Approval
- Personnel Turnover

HUMAN RESOURCE DEVELOPMENT

- Organization Manpower Characteristics
- Average Grade Level

TABLE E-2: RELATIONSHIP OF MANAGEMENT INDICATORS TO KEY GOALS

organizations is to be consistent. Extreme care, however, must be exercised in the application of management indicators to avoid overkill. The indicators described in this section were developed by the laboratory for use at the local level. It would be totally unrealistic to assume, for example, that Headquarters would track the number of people attending laboratory functions and, therefore, have a continuous measure of organization health. Such an indicator may be used once or twice in several years to check organizational morale. Every organization is unique in terms of management style, organization structure, environment, etc. The beauty of the critical success factor method and associated measurement indices is that it leads to individualized management information tailored to the unique needs of any organization and any level in an organization. The problem facing the IRM and data automation communities is to develop an information systems process that achieves the needed management information flexibility.

APPENDIX F

ORGANIZATION COORDINATION/APPROVAL STATEMENTS

tl
- 1 -
Date: 16 Feb 1982 (Tuesday) 0822-EST
From: HQLIRM
Subject: ACD (Mr. Shahady): Draft Information Requirements Document
To: AFVAL
cc: HQLIRM

We have reviewed the draft requirements document and find it completely acceptable. It is an excellent first step in the development of a meaningful IRM program for the laboratories. We concur with the submission of the document to HQ AFSC/AC in its present form.

Maj Bob Baker
HQ AFSC/DLXM

*

DISTRIBUTION
DATE: 16 FEB 82
TIME: 0830
DISTRIBUTED TO
ACD - Shahady

DEPARTMENT OF THE AIR FORCE
AIR FORCE ARMAMENT LABORATORY (AFSC)
EGLIN AIR FORCE BASE, FLORIDA 32542

22 FEB 1982

REPLY TO
ATTN OF: CV

SUBJECT: AFSC Management Information Requirements Document (Your ltr, dtd 29 Jan 82)

TO: AFWAL/ACD
Mr Paul Shahady
Wright-Patterson AFB OH 45433

1. Subject document has been reviewed and the following suggestions are offered:

a. Recommend in the summary on page vii the following additional findings which we believe were mentioned as the study progressed.

(1) There are two distinct levels of information requirements. The first involves information needed by a program manager to manage a program. The second is that information which is needed to report program status/progress to management. The potential for increased productivity through simplified manual systems or automation exists at both levels.

(2) Some RCS and non-RCS reports no longer go to the headquarters office which originally requested them. In some cases the office no longer exists and in other cases only parts of reports are still useful to the requesting office.

b. Suggest the following paragraph as a recommendation on page ix:

Expand the study of RCS and non-RCS reports which Laboratories submit to headquarters in an attempt to eliminate or reduce them.

2. The following editorial comments apply:

a. Pages 8 and E-1: Remove "Test" from the "Air Force Armament Laboratory".

b. Page 8: AFGL, AFWAL, AFWL, AFHRL, AFRPL, and AFAPL seem to be missing from the list of organizations reporting to DL.

c. Page 10 first line: SON stands for "Statement of Operational Need".

d. Page 15: (23-1) should probably have AFR or AFSCR as appropriate.

e. Page 51 5th line: "seen" rather than "been".

f. Page B-9 5th line from bottom: "closet" should be "close".

g. Page C-23 4th line: "repeated" rather than "repreated".

h. Page E-4 Political Approval/Rejections: Should the first word be "stated" rather than "started"?

3. Suggest the recommendations on page 66 be numbered for easier future reference as they seem to be a good start toward the LIRM PMP which the working group may soon be preparing. Also suggest a recommendation favoring continued coordination between product divisions, test centers, and laboratories.

4. Reference page 24, the AFATL also has a System 2000 manpower and personnel file which was developed in-house several years ago. It may be worthwhile comparing the two capabilities to further extend the technology exchange planned between USAFSAM and the AFWAL.

5. The AFATL rankings for Figure 8 are, from top to bottom, as follows: 5, 7, 2, 4, 6, 1, and 3.

6. We found the report informative and believe it will serve as an excellent foundation for follow-on activity.

John R Taylor

JOHN R. TAYLOR, Colonel, USAF
Vice Commander

DEPARTMENT OF THE AIR FORCE
AIR FORCE GEOPHYSICS LABORATORY (AFSC)
HANSCOM AIR FORCE BASE, MASSACHUSETTS 01731

REPLY TO ATTN OF: XOR/A. Almon, AV 478-2131

FEB 1 [illegible]

SUBJECT: AFSC Management Information Requirements Document (Your Ltr, 29 Jan 82)

TO: AFWAL/ACD (Mr. P. Shahady)

I have reviewed subject document with AFGL's Data Administrator, Austin Almon, and find no changes are required.

GERALD P. D'ARCY, Colonel, USAF
Vice Commander

DEPARTMENT OF THE AIR FORCE
AIR FORCE HUMAN RESOURCES LABORATORY (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235

17 FEB 1982

REPLY TO ATTN OF: CV

SUBJECT: AFSC Management Information Requirements Document (Your Ltr, 29 Jan 1982)

TO: AFWAL/ACD

1. We have reviewed subject document and propose no modifications at this time. Minor changes and other administrative comments were provided to you by Mr. Joe Muniz, on 10 Feb 1982.

2. Because of the importance of the document, additional time is needed for coordination with the AFHRL staff. As agreed, further comments will be furnished during the next LIRM meeting.

3. AFWAL and the Laboratories' data administrators are to be congratulated on the quality of the product. I consider the Information Requirements Study to be a foundation to support implemention of IRM within AFSC.

4. The planned next step will exceed the time and effort required for the first study. Your assessment should be brought to the attention of LIRM, ESD and AFSC. The LIRM should ensure that the recommendations as noted are implemented throughout AFSC.

Kenneth E. Stout

KENNETH E. STOUT, Colonel, USAF
Vice Commander

Cy to: HQ AFSC/DLX

-t2 -
Date: 16 Feb 1982 (Tuesday) 1609-EST
From: AFOSR
Subject: AFSC Management Information Requirements Document
To: AFWAL, AFOSR

The Air Force Office of Scientific Research accepts the requirements document without change.

A letter, signed by Col Hartke, will be provided at the March LIRM Meeting at San Antonio.

CHERYL P> BOWEN
LIRM Focal Point
*

DISTRIBUTION
DATE: 17 FEB 1982
TIME: 1600
DISTRIBUTED TO
P. Shahady

DEPARTMENT OF THE AIR FORCE
AIR FORCE WRIGHT AERONAUTICAL LABORATORIES (AFSC)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

REPLY TO
ATTN OF: GL

8 MAR 1982

SUBJECT: AFSC Management Information Requirements Document

TO: ACD (Mr P. Shahady)

The Air Force Wright Aeronautical Laboratories (AFWAL) approves the Laboratory Management Information Requirements document as developed by the Laboratory Data Administrators. However, I recommend that you emphasize the need for historical data in key business functions in order to facilitate trend analyses. The document forms an excellent basis for the development of an integrated Information Resource Management Program throughout the laboratories.

DAVID W. PECK
Colonel, USAF
Director of Management Services

DEPARTMENT OF THE AIR FORCE
AIR FORCE WEAPONS LABORATORY (AFSC)
KIRTLAND AIR FORCE BASE, NM 87117

REPLY TO ATTN OF CV

19 FEB 1982

SUBJECT AFSC Management Information Requirements Document

TO AFWAL Data Administrator (Paul Shahady)

The AFWL has reviewed the draft AFSC/DL information requirements document and has found it acceptable.

TONY M. JOHNSON, Colonel, USAF
Vice Commander

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AEROSPACE MEDICAL DIVISION (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235

REPLY TO ATTN OF: RD

19 FEB 1982

SUBJECT: AFSC Mgt Information Requirements

TO: AFWAL/ACD

1. The AFSC Management Information Requirements Document has been reviewed by the AMD executive steering group member, Col Butler, and is approved as written with the following suggestion:

- Reference page ix, paragraph 3, "The following recommendations resulted from this study". We do not indicate who we are addressing the recommendations to.

2. The report is well written and presents a good foundation document for the identification of management information requirements. However, I wonder if we have responded to AFSC's Program Direction.

Thomas M Butler

THOMAS M. BUTLER, Colonel, USAF, BSC
Deputy Director of Research and Development

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS ROME AIR DEVELOPMENT CENTER (AFSC)
GRIFFISS AIR FORCE BASE, NEW YORK 13441

REPLY TO ATTN OF: CV

16 FEB 82

SUBJECT: AFSC Management Information Requirements Document

TO: AFWAL/ACD/Paul A. Shahady
W-PAFB OH 45433

1. This document meets its goal of providing a framework for future information development efforts. When viewed as a general background for future work, it will provide a good source of information for the development of a long range information resource management program for the laboratories.

2. The document is acceptable with no revisions required.

OWEN R. LAWTER, Colonel, USAF
Vice Commander

NETMAIL

TO: AFWAL,AFRPL

SUBJECT: Coordination of MIR Report

We have reviewed the AFSC Management Information Requirements Document and accept it as written.

The AFRPL portion of Figure 8 should read Plans/Programs-5, Program Management-1, Work Unit Tracking-4, Procurement/Contracts-blank, Logistics Management-3, Budget/Finance-blank, Manpower/Personnel-2.

Allan J. MacLaren

ALLAN J. MACLAREN, Col, USAF
Deputy Director
AFRPL